

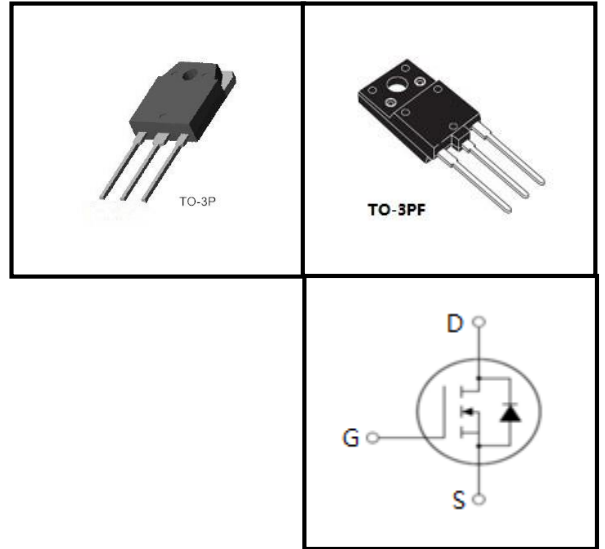
900V N-Channel MOSFET

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
CS11N90V	TO-3P	CS11N90V
CS11N90VF	TO-3PF	CS11N90VF

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

Parameter	Symbol	Value		Unit
		TO-3P	TO-3PF	
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	900		V
Continuous Drain Current	I_D	11		A
Pulsed Drain Current (note1)	I_{DM}	44		A
Gate-Source Voltage	V_{GSS}	± 30		V
Single Pulse Avalanche Energy (note2)	E_{AS}	520.2		mJ
Avalanche Current (note1)	I_{AS}	10.2		A
Repetitive Avalanche Energy (note1)	E_{AR}	312.1		mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	70		W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150		$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value		Unit
		TO-3P	TO-3PF	
Thermal Resistance, Junction-to-Case	R_{thJC}	2		K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	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	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 900V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	μA
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)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 5.5A$	--	0.75	0.96	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	2571	--	pF
Output Capacitance	C_{oss}		--	244	--	
Reverse Transfer Capacitance	C_{rss}		--	46	--	
Total Gate Charge	Q_g	$V_{DD} = 720V, I_D = 11A,$ $V_{GS} = 10V$	--	107	--	nC
Gate-Source Charge	Q_{gs}		--	11.6	--	
Gate-Drain Charge	Q_{gd}		--	58.6	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 450V, I_D = 11A,$ $R_G = 25\Omega$	--	54	--	ns
Turn-on Rise Time	t_r		--	44	--	
Turn-off Delay Time	$t_{d(off)}$		--	444	--	
Turn-off Fall Time	t_f		--	86	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	11	A
Pulsed Diode Forward Current	I_{SM}		--	--	44	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 5.5A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 11A,$ $di_F/dt = 100A/\mu s$	--	530	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.4	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=10\text{mH}, V_{DD} = 50V, R_G = 25\Omega$, 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 ($T_J = 25^\circ\text{C}$)

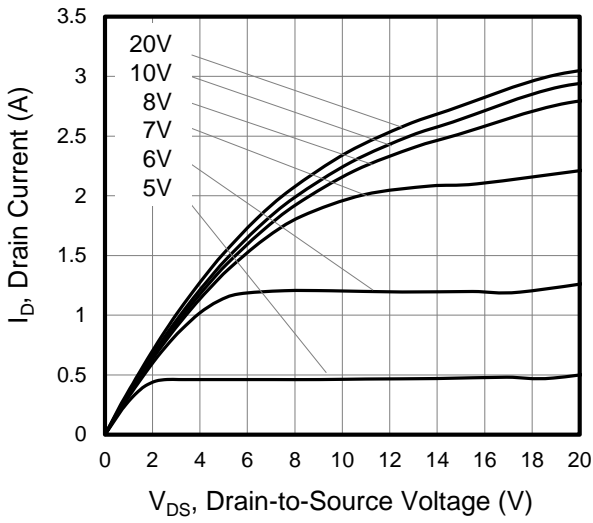


Figure 2. Body Diode Forward Voltage

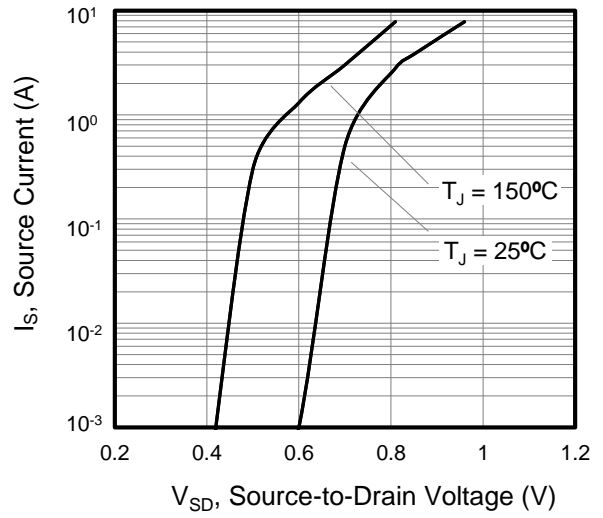


Figure 3. Drain Current vs. Temperature

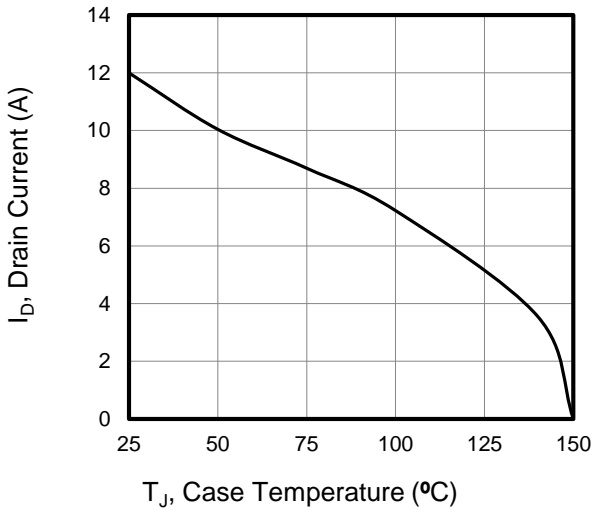


Figure 4. BV_{DSS} Variation vs. Temperature

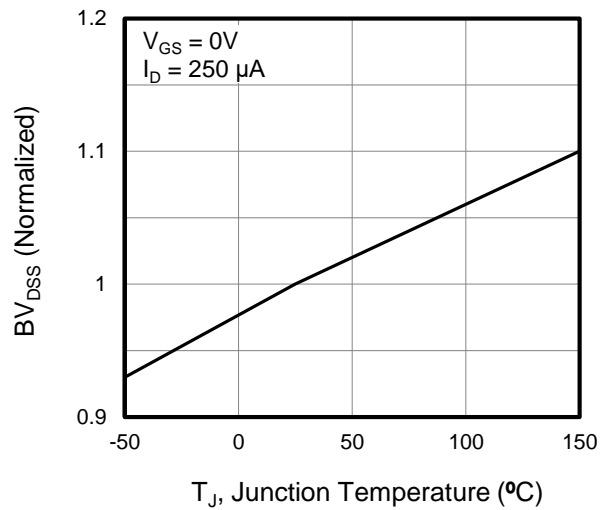


Figure 5. Transfer Characteristics

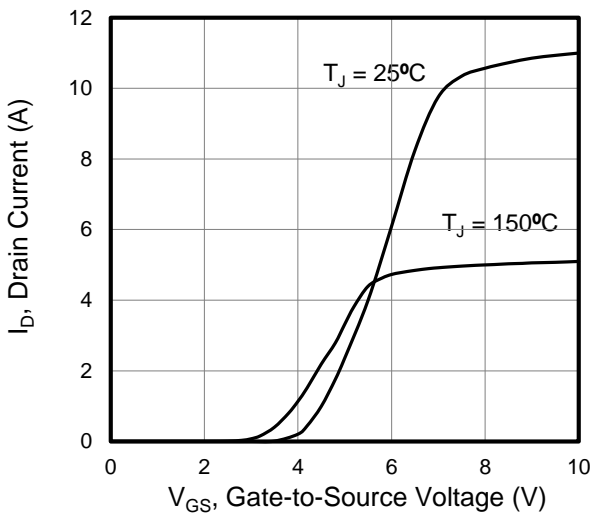
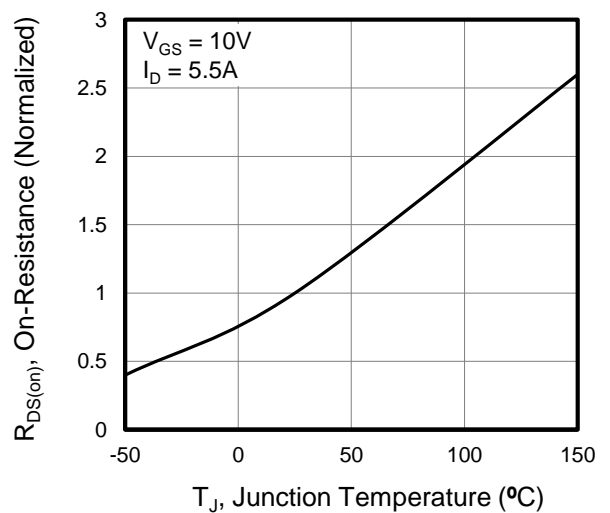


Figure 6. On-Resistance vs. Temperature



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

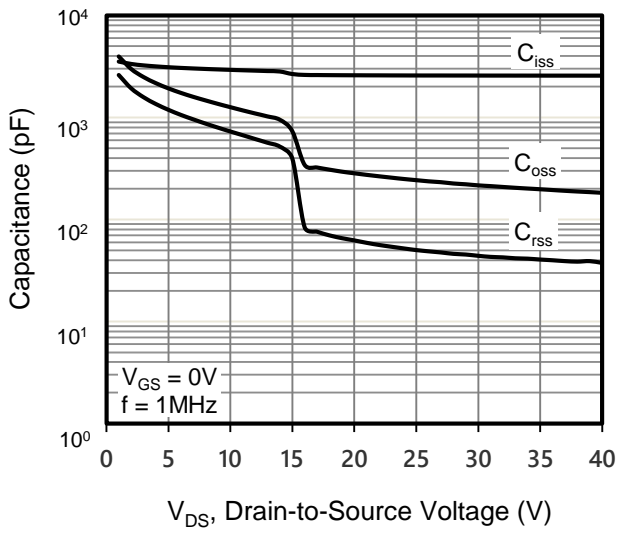
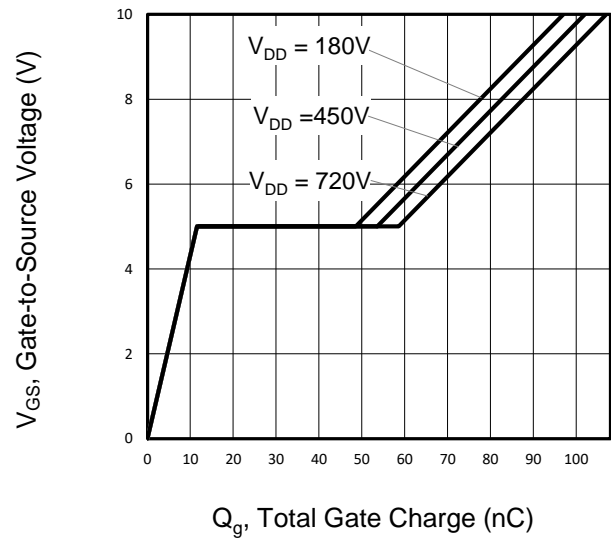
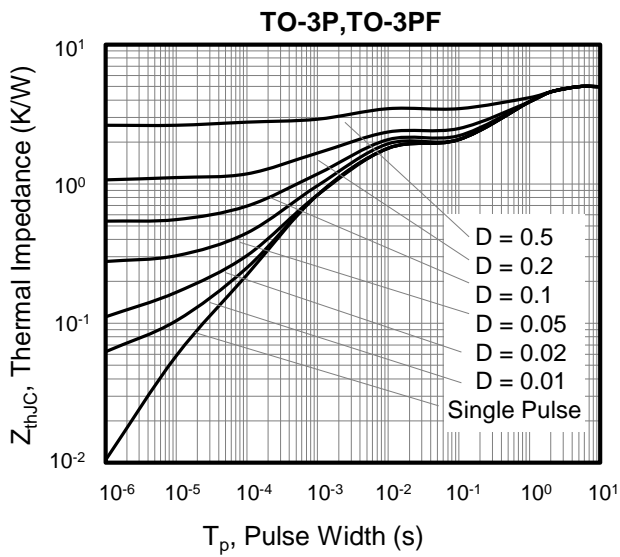
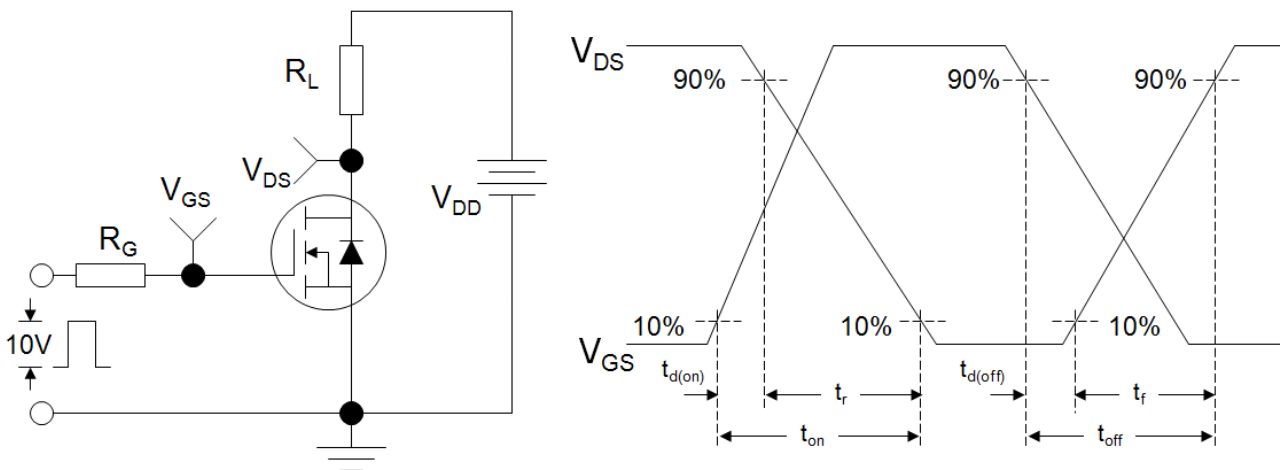
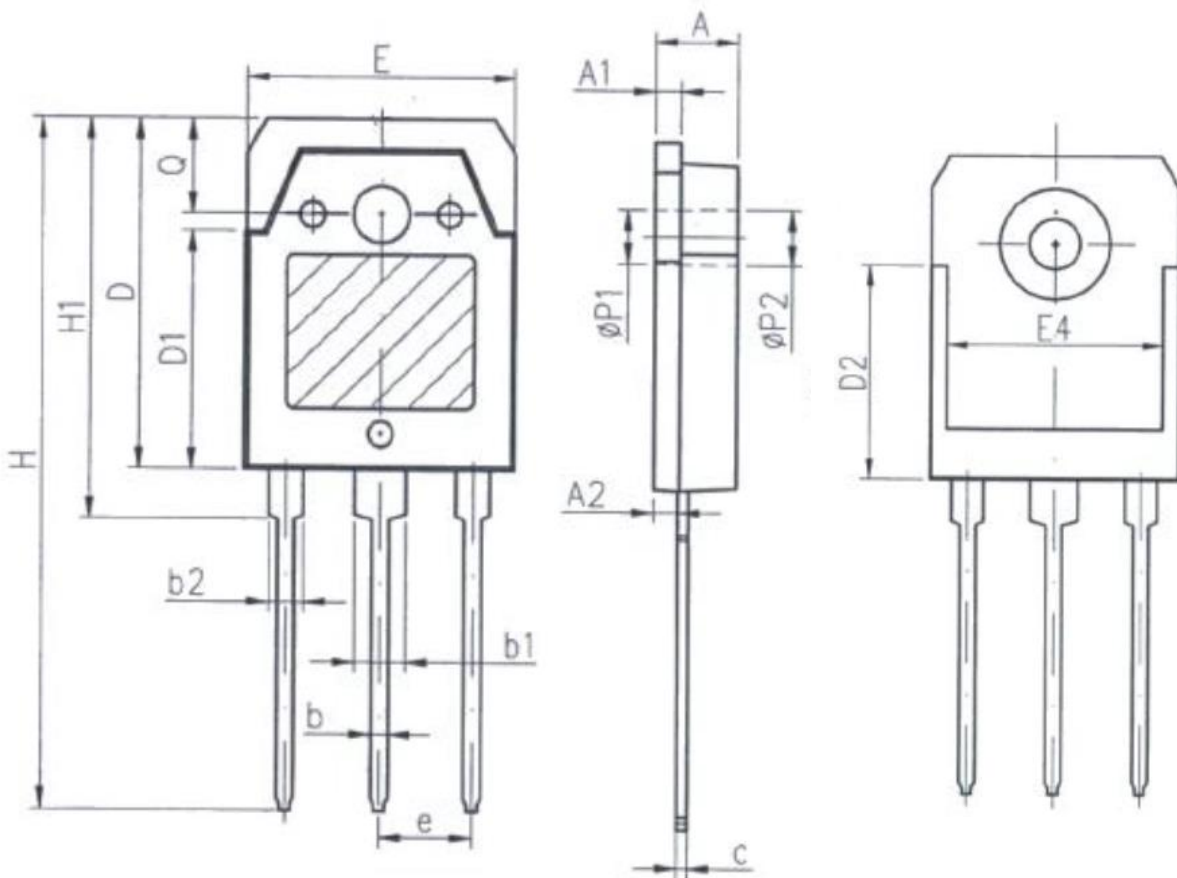
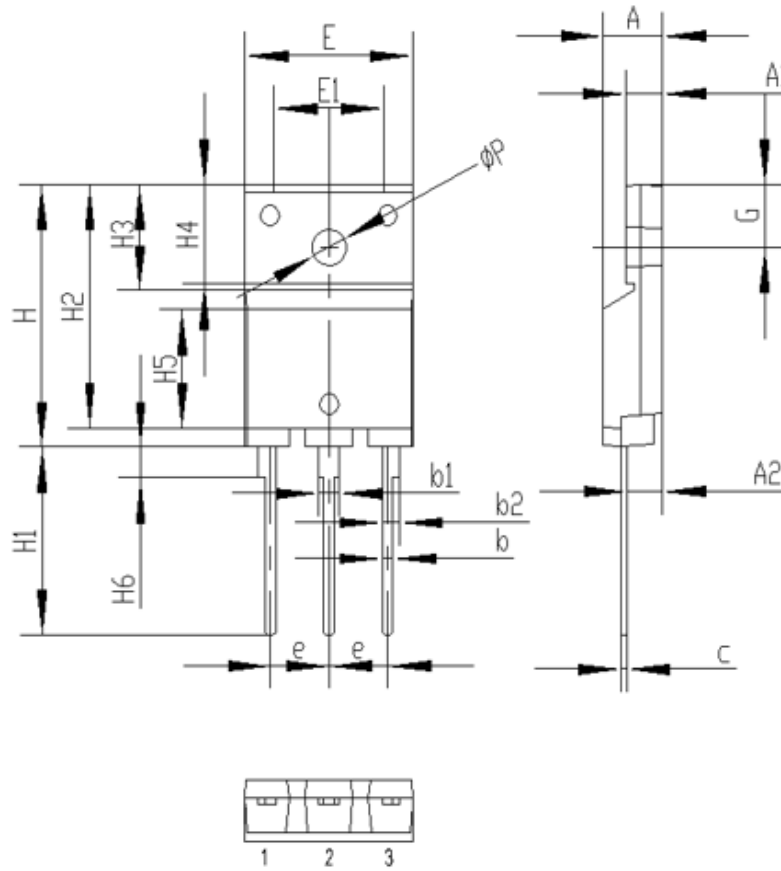
Figure 7. Capacitance

Figure 8. Gate Charge

Figure 9. Transient Thermal Impedance


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-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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