

**CN54F194-X REV 0A0**

 Original Creation Date: 06/25/97  
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**4-BIT BIDIRECTIONAL UNIVERSAL SHIFT REGISTER**
**General Description**

The F194 is a high-speed 4-bit bidirectional universal shift register. As a high-speed, multifunctional, sequential building block, it is useful in a wide variety of applications. It may be used in serial-serial, shift left, shift right, serial-parallel, parallel-serial, and parallel-parallel data register transfers. The F194 is similar in operation to the F195 universal shift register, with added features of shift left without external connections and hold (do nothing) modes of operation.

**Industry Part Number**

54F194

**NS Part Numbers**

54F194DC

**Prime Die**

M194

**Processing**
**Quality Conformance Inspection**
**Subgrp Description Temp ( °C)**

1	Static tests at	+25
2	Static tests at	+70
3	Static tests at	0
4	Dynamic tests at	+25
5	Dynamic tests at	+70
6	Dynamic tests at	0
7	Functional tests at	+25
8A	Functional tests at	+70
8B	Functional tests at	0
9	Switching tests at	+25
10	Switching tests at	+70
11	Switching tests at	0

### Features

- Typical Shift Frequency of 150 MHZ
- Asynchronous Master Reset
- Hold (do Nothing) Mode
- Fully Synchronous Serial or Parallel Data Transfers

**(Absolute Maximum Ratings)**

(Note 1)

Storage Temperature	-65 C to +150 C
Ambient Temperature under Bias	-55 C to +125 C
Junction Temperature under Bias	-55 C to +175 C
Vcc Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0mA
Voltage Applied to Output in HIGH State (with Vcc=0V)	
Standard Output	-0.5V to Vcc
TRI-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I <sub>ol</sub> (mA)

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

**Recommended Operating Conditions**

Free Air Ambient Temperature Commercial	0 C to +70 C
Supply Voltage Commercial	+4.5V to +5.5V

## Electrical Characteristics

### DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC: VCC 4.5V to 5.5V, 0C to +70C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
VIH	Input HIGH Voltage	Recognized as a HIGH Signal	1	INPUTS	2.0		V	1, 2, 3
VIL	Input LOW Voltage	Recognized as a LOW Signal	1	INPUTS		0.8	V	1, 2, 3
VCD	Input Clamp Diode Voltage	VCC=4.5V, IIN=-18mA	2, 3	INPUTS		-1.2	V	1, 2, 3
VOH	Output HIGH Voltage	VCC=4.5V, IOH=-1.0mA	2, 3	OUTPUTS	2.5		V	1, 2, 3
		VCC=4.75V, IOH=-1.0mA	2, 3	OUTPUTS	2.7		V	1, 2, 3
VOL	Output LOW Voltage	VCC=4.5V, IOL = 20mA	2, 3	OUTPUTS		0.5	V	1, 2, 3
IIH	Input HIGH Current	VCC=5.5V, VIN=2.7V	2, 3	INPUTS		5.0	uA	1, 2, 3
IBVI	Input HIGH Current Breakdown Test	VCC=5.5V, VIN=7.0V	2, 3	INPUTS		7.0	uA	1, 2, 3
ICEX	Output HIGH Leakage Current	VCC=5.5V, VOUT = VCC	2, 3	OUTPUTS		100	uA	1, 2, 3
VID	Input Leakage Test	VCC = 0.0V, IID = 1.9uA, All other pins grounded	2, 3	INPUTS	4.75		V	1, 2, 3
IOD	Output Leakage Circuit Current	VCC = 0.0V, VIOD = 150mV, All other pins grounded	2, 3	OUTPUTS		4.75	uA	1, 2, 3
IIL	Input LOW Current	VCC=5.5V, VIN=0.5V	2, 3	INPUTS		-0.6	mA	1, 2, 3
IOS	Output Short-Circuit Current	VCC=5.5V, VOUT = 0V	2, 3	OUTPUTS	-60	-150	mA	1, 2, 3
ICC	Power Supply Current	VCC=5.5V	2, 3	VCC		46	mA	1, 2, 3

### AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC: CL=50pF, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS. Temp Range: 0C to +70C

fMAX	Maximum Shift Frequency	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4		105		MHZ	9
			4		90		MHZ	10, 11
tpLH	Propagation Delay	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to Qn	3.5	7.0	ns	9
			2, 3	CP to Qn	3.5	8.0	ns	10, 11

## Electrical Characteristics

### AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC: CL=50pf, RL=500 OHMS, TR=2.5ns, TF=2.5ns SEE AC FIGS. Temp Range: 0C to +70C

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL(1)	Propagation Delay	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	CP to Qn	3.5	7.0	ns	9
			2, 3	CP to Qn	3.5	8.0	ns	10, 11
tpHL(2)	Propagation Delay	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	2, 3	MR to Qn	4.5	12.0	ns	9
			2, 3	MR to Qn	4.5	14.0	ns	10, 11
ts(H)	Setup Time HIGH	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Pn/DSR or DSL/CP	4.0		ns	9, 10, 11
ts(L)	Setup Time LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Pn/DSR or DSL/CP	4.0		ns	9, 10, 11
th(H)	Hold Time HIGH	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Pn/DSR or DSL/CP	1.0		ns	9, 10, 11
th(L)	Hold Time LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Pn/DSR or DSL/CP	0		ns	9
			4	Pn/DSR or DSL/CP	1.0		ns	10, 11
ts (H)	Setup Time HIGH	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Sn to CP	10.0		ns	9
			4	Sn to CP	11.0		ns	10, 11
ts (L)	Setup Time LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Sn to CP	8.0		ns	9, 10, 11
th(H/L)	Hold Time HIGH or LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	Sn to CP	0		ns	9, 10, 11
tw (H)	Pulse Width HIGH	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	CP	5.0		ns	9
			4	CP	5.5		ns	10, 11
tw (L)	Pulse Width LOW	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	MR	5.0		ns	9, 10, 11
tREC	Recovery Time	VCC=+5.0V @ +25C, VCC=4.5V & 5.5V @ 0/+70C	4	MR to CP	9.0		ns	9
			4	MR to CP	11.0		ns	10, 11

Note 1: Guaranteed by applying specific input condition and testing VOL & VOH.

Note 2: Screen tested 100% on each device at +75 C temperature only, subgroups A2 & A10.

Note 3: Sample tested (Method 5005, Table 1) on each MFG. lot at +75C temperature only, subgroups A2 & A10.

*(Continued)*

Note 4: Guaranteed but not tested.

**Revision History**

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0001702	07/08/97	Linda Collins	Legal issue with Fairchild, due to the Fairchild/National split, is forcing the change from CN74F which is 'Fairchilds' product code to CN54F which is 'Nationals' product code.