

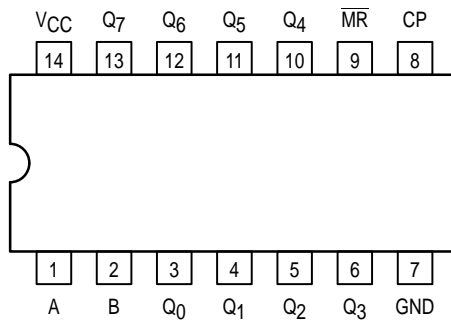


# 8-BIT SERIAL-IN, PARALLEL-OUT SHIFT REGISTER

The MC54/74F164 is a high-speed 8-bit serial-in/parallel-out shift register. Serial data is entered through a 2-input AND gate synchronous with the LOW-to-HIGH transition of the clock. The device features an asynchronous Master Reset which clears the register, setting all outputs LOW independent of the clock.

- Typical Shift Frequency of 90 MHz
- Asynchronous Master Reset
- Gated Serial Data Input
- Fully Synchronous Data Transfers

### CONNECTION DIAGRAM



### MODE SELECT TABLE

Operating Mode	Inputs			Outputs	
	$\overline{MR}$	A	B	Q <sub>0</sub>	Q <sub>1</sub> -Q <sub>7</sub>
Reset (Clear)	L	X	X	L	L-L
Shift	H	l	l	L	q <sub>0</sub> -q <sub>6</sub>
	H	l	h	L	q <sub>0</sub> -q <sub>6</sub>
	H	h	l	L	q <sub>0</sub> -q <sub>6</sub>
	H	h	h	H	q <sub>0</sub> -q <sub>6</sub>

H(h) = HIGH Voltage Levels

L(l) = LOW Voltage Levels

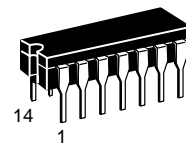
X = Don't Care

q<sub>n</sub> = Lower case letters indicate the state of the referenced input or output one setup time prior to the LOW-to-HIGH clock transition.

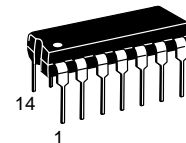
## MC54/74F164

### 8-BIT SERIAL-IN, PARALLEL-OUT SHIFT REGISTER

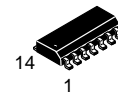
FAST™ SHOTTKY TTL



**J SUFFIX**  
CERAMIC  
CASE 632-08



**N SUFFIX**  
PLASTIC  
CASE 646-06

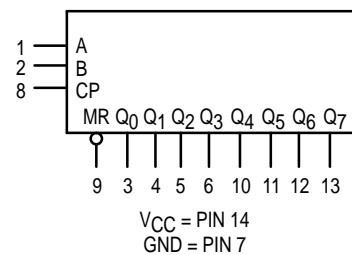


**D SUFFIX**  
SOIC  
CASE 751A-02

### ORDERING INFORMATION

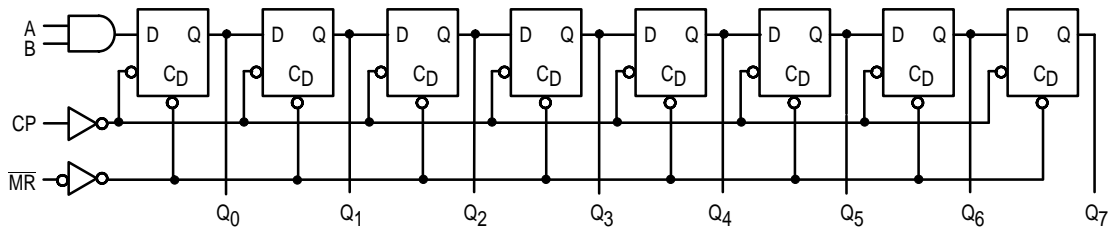
MC54FXXXJ Ceramic  
MC74FXXXN Plastic  
MC74FXXXD SOIC

### LOGIC SYMBOL



# MC54/74F164

## LOGIC DIAGRAM



## FUNCTIONAL DESCRIPTION

The F164 is an edge-triggered 8-bit shift register with serial data entry and an output from each of the eight stages. Data is entered serially through one of two inputs (A or B); either of these inputs can be used as an active HIGH Enable for data entry through the other input. An unused input must be tied HIGH.

Each LOW-to-HIGH transition on the Clock (CP) input shifts data one place to the right and enters into Q<sub>0</sub> the logical AND of the two data inputs (A • B) that existed before the rising clock edge. A LOW level on the Master Reset ( $\overline{\text{MR}}$ ) input overrides all other inputs and clears the register asynchronously, forcing all Q outputs LOW.

## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	54, 74	4.5	5.0	5.5	V
T <sub>A</sub>	Operating Ambient Temperature Range	54	-55	25	125	°C
		74	0	25	70	
I <sub>OH</sub>	Output Current — High	54, 74			-1.0	mA
I <sub>OL</sub>	Output Current — Low	54, 74			20	mA

## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
V <sub>IH</sub>	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage
V <sub>IL</sub>	Input LOW Voltage			0.8	V	Guaranteed Input LOW Voltage
V <sub>IK</sub>	Input Clamp Diode Voltage			-1.2	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	54, 74	2.5		V	I <sub>OH</sub> = -1.0 mA, V <sub>CC</sub> = MIN
		74	2.7		V	I <sub>OH</sub> = -1.0 mA, V <sub>CC</sub> = 4.75 V
V <sub>OL</sub>	Output LOW Voltage			0.5	V	I <sub>OL</sub> = 20 mA, V <sub>CC</sub> = MIN
I <sub>IH</sub>	Input HIGH Current			20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V
				0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V
I <sub>IL</sub>	Input LOW Current			-0.6	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.5 V
I <sub>OS</sub>	Output Short Circuit Current (Note 2)	-60		-150	mA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0 V
I <sub>CC</sub>	Power Supply Current		35	55	mA	A, B = GND, V <sub>CC</sub> = MAX CP = HIGH, $\overline{\text{MR}}$ = GND

### NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.
- Not more than one output should be shorted at a time, nor for more than 1 second.

# MC54/74F164

## AC CHARACTERISTICS

Symbol	Parameter	54/74F			54F		74F		Unit
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0 V C <sub>L</sub> = 50 pF			T <sub>A</sub> = -55°C to +125°C V <sub>CC</sub> = 5.0 V ± 10% C <sub>L</sub> = 50 pF		T <sub>A</sub> = 0°C to +70°C V <sub>CC</sub> = 5.0 V ± 10% C <sub>L</sub> = 50 pF		
		Min	Typ	Max	Min	Max	Min	Max	
f <sub>max</sub>	Maximum Clock Frequency	80	90		70		80		MHz
t <sub>PLH</sub>	Propagation Delay	3.0	6.0	8.0	3.0	11	3.0	9.0	ns
t <sub>PHL</sub>	CP to Q <sub>n</sub>	5.0	7.5	10	5.0	13	5.0	11	
t <sub>PHL</sub>	Propagation Delay MR to Q <sub>n</sub>	5.5	10.5	13	5.5	16	5.5	14	ns

## AC OPERATING REQUIREMENTS

Symbol	Parameter	54/74F			54F		74F		Unit
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0 V			T <sub>A</sub> = -55°C to +125°C V <sub>CC</sub> = 5.0 V ± 10%		T <sub>A</sub> = 0°C to +70°C V <sub>CC</sub> = +5.0 V ± 10%		
		Min	Typ	Max	Min	Max	Min	Max	
t <sub>S(H)</sub>	Setup Time, HIGH or LOW	7.0			7.0		7.0		ns
t <sub>S(L)</sub>	D <sub>n</sub> to CP	7.0			7.0		7.0		
t <sub>H(H)</sub>	Hold Time, HIGH or LOW	1.0			1.0		1.0		
t <sub>H(L)</sub>	D <sub>n</sub> to CP	1.0			1.0		1.0		ns
t <sub>W(H)</sub>	CP Pulse Width, HIGH or LOW	4.0			4.0		4.0		
t <sub>W(L)</sub>		7.0			7.0		7.0		
t <sub>W(L)</sub>	MR Pulse Width, LOW	7.0			7.0		7.0		ns
t <sub>rec</sub>	Recovery Time, MR to CP	7.0			7.0		7.0		ns