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**Printed on:Sat, Aug 13, 1994 11:15:02**

**From book:mc54f**

**Document:mc74f299rev5**

**Last saved on:Fri, Aug 12, 1994 13:38:16**



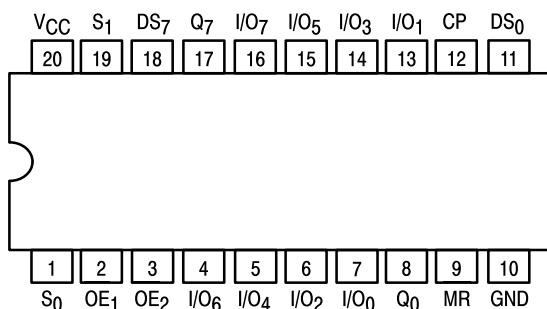
# 8-INPUT UNIVERSAL SHIFT/STORAGE REGISTER WITH COMMON PARALLEL I/O PINS

The MC74F299 is an 8-Bit Universal Shift/Storage Register with 3-state outputs. Four modes of operation are possible: hold (store), shift left, shift right and load data.

The parallel load inputs and flip-flop outputs are multiplexed to reduce the total number of package pins. Separate outputs are provided for flip-flops Q<sub>0</sub> and Q<sub>7</sub> to allow easy cascading. A separate active LOW Master Reset is used to reset the register.

- Common I/O for Reduced Pin Count
- Four Operation Modes: Shift left, Shift Right, Load and Store
- Separate Shift Right Serial Input and Shift Left Serial Input for Easy Cascading
- 3-State Outputs for Bus Oriented Applications
- Input Clamp Diodes Limit High-Speed Termination Effects

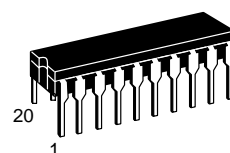
## CONNECTION DIAGRAM



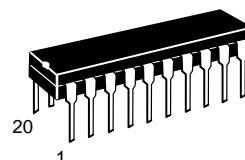
**MC74F299**

**8-INPUT UNIVERSAL  
SHIFT/STORAGE REGISTER  
WITH COMMON  
PARALLEL I/O PINS**

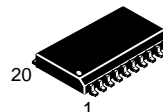
**FAST™ SCHOTTKY TTL**



**J SUFFIX  
CERAMIC  
CASE 732-03**



**N SUFFIX  
PLASTIC  
CASE 738-03**



**DW SUFFIX  
SOIC  
CASE 751D-03**

## ORDERING INFORMATION

MC74FXXXJ Ceramic  
MC74FXXXN Plastic  
MC74FXXXDW SOIC

## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	74	4.5	5.0	5.5	V
T <sub>A</sub>	Operating Ambient Temperature Range	74	0	25	70	°C
I <sub>OH</sub>	Output Current — High	74			−1.0/−3.0	mA
I <sub>OL</sub>	Output Current — Low	74			20/24	mA

# MC74F299

FUNCTION TABLE

Inputs				Response
MR	S <sub>1</sub>	S <sub>0</sub>	CP	
L	X	X	X	Asynchronous Reset: Q <sub>0</sub> –Q <sub>7</sub> = LOW
H	H	H	↑	Parallel Load: I/O <sub>n</sub> Q <sub>n</sub>
H	L	H	↑	Shift Right: DS <sub>0</sub> Q <sub>0</sub> , Q <sub>0</sub> Q <sub>1</sub> , etc.
H	H	L	↑	Shift Left: DS <sub>7</sub> Q <sub>7</sub> , Q <sub>7</sub> Q <sub>6</sub> , etc.
H	L	L	X	Hold

H = HIGH Voltage Level

L = LOW Voltage Level

X = Don't Care

↑ = LOW-to-HIGH clock transition.

## FUNCTIONAL DESCRIPTION

The MC74F299 is an 8-bit universal shift/storage register with 3-state outputs. Four modes of operation are possible: hold (store), shift left, shift right and load data. The parallel load inputs and flip-flop outputs are multiplexed to reduce the total number of package pins. Additional outputs are provided for flip-flops Q<sub>0</sub> and Q<sub>7</sub> to allow easy serial cascading. A separate active-LOW Master Reset is used to reset the register.

The MC74F299 contains eight edge-triggered D-type flip-flops and the interstage logic necessary to perform synchronous shift left, shift right, parallel load and hold operations. The type of operation is determined by S<sub>0</sub> and S<sub>1</sub>, as shown in the Function Table. All flip-flop outputs are brought out through 3-state buffers to separate I/O pins that also serve as data inputs in the parallel load mode. Q<sub>0</sub> and Q<sub>7</sub>

are also brought out on other pins for expansion in serial shifting of longer words.

A LOW signal on MR overrides the Select and CP inputs and resets the flip-flops. All other state changes are initiated by the rising edge of the clock. Inputs can change when the clock is in either state provided only that the recommended set-up and hold times, relative to the rising edge of CP, are observed.

A HIGH signal on either OE<sub>1</sub> or OE<sub>2</sub> disables the 3-state buffers and puts the I/O pins in the high impedance state. In this condition the shift, hold, load and reset operations can still occur. The 3-state buffers are also disabled by HIGH signals on both S<sub>0</sub> and S<sub>1</sub> in preparation for a parallel load operation.

## 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	Q <sub>0</sub> /Q <sub>7</sub>	74	2.5		V	I <sub>OH</sub> = −1.0 mA	V <sub>CC</sub> = 4.5 V
			74	2.7				V <sub>CC</sub> = 4.75 V
		I/O	74	2.7	3.4	V	I <sub>OH</sub> = −3.0 mA	V <sub>CC</sub> = 4.75 V
			74	2.4				V <sub>CC</sub> = 4.5 V
V <sub>OL</sub>	Output LOW Voltage	Q <sub>0</sub> /Q <sub>7</sub>			0.5	V	I <sub>OL</sub> = 20 mA	V <sub>CC</sub> = MIN
		I/O			0.5		I <sub>OL</sub> = 24 mA	
I <sub>IH</sub>	Input HIGH Current	Q <sub>0</sub> /Q <sub>7</sub>			20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V	
		I/O			70			
		Q <sub>0</sub> /Q <sub>7</sub>			0.1	mA	V <sub>CC</sub> = MAX	V <sub>IN</sub> = 7.0 V
		I/O			1.0			V <sub>IN</sub> = 5.5 V
I <sub>IL</sub>	Input LOW Current	S <sub>0</sub> , S <sub>1</sub>			−1.2	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.5 V	
		Other Inputs			−0.6			
I <sub>OZH</sub>	Off-State Output Current, High-Level Voltage Applied				70	μA	V <sub>CC</sub> = MAX	V <sub>OUT</sub> = 2.7 V
					1.0	mA		V <sub>OUT</sub> = 5.5 V
I <sub>OZL</sub>	Off-State Output Current, Low-Level Voltage Applied				−0.6	mA	V <sub>CC</sub> = MAX, V <sub>OUT</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>	Total Supply Current				95	mA		OE = HIGH, CP = HIGH

### NOTES:

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

# MC74F299

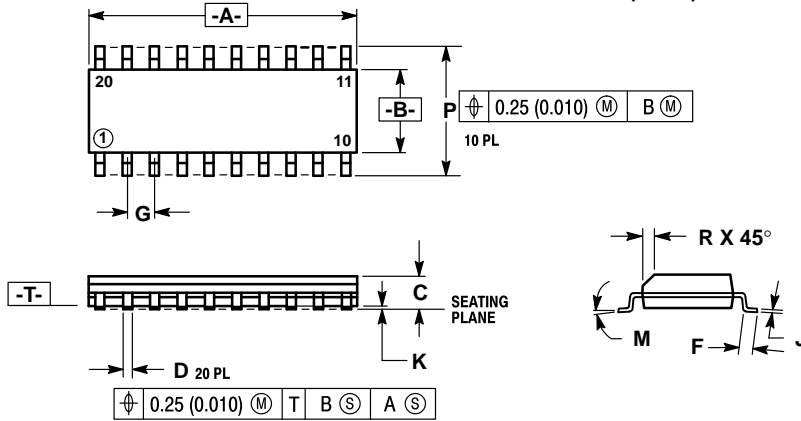
## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	74F		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> = 0°C to +70°C V <sub>CC</sub> = +5.0 V ±10% C <sub>L</sub> = 50 pF		
		Min	Max	Min	Max	
f <sub>MAX</sub>	Maximum Clock Frequency	70		70		MHz
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay CP to Q <sub>0</sub> or Q <sub>7</sub>	3.5 4.5	7.5 8.0	3.5 4.5	8.5 8.5	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay CP to I/O <sub>n</sub>	3.5 4.0	9.0 9.0	3.5 4.0	10 10	ns
t <sub>PHL</sub>	Propagation Delay MR to Q <sub>0</sub> or Q <sub>7</sub>	5.5	9.5	5.5	10.5	ns
t <sub>PHL</sub>	Propagation Delay MR to I/O <sub>n</sub>	5.5	10	5.5	10.5	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time to HIGH or LOW Level	3.5 4.0	8.0 10	3.5 4.0	9.0 11	ns
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time to HIGH or LOW Level	2.0 1.0	7.0 5.5	2.0 1.0	8.0 6.5	ns

## AC SETUP REQUIREMENTS

Symbol	Parameter	74F			74F		Unit
		$T_A = +25^{\circ}\text{C}$ $V_{CC} = +5.0\text{ V}$ $C_L = 50\text{ pF}$			$T_A = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = +5.0\text{ V } \pm 10\%$ $C_L = 50\text{ pF}$		
		Min	Typ	Max	Min	Max	
$t_{S(H)}$ $t_{S(L)}$	Set-Up Time, HIGH or LOW $S_0$ or $S_1$ to CP	6.5 6.5			7.5 7.5		ns
$t_{h(H)}$ $t_{h(L)}$	Hold Time, HIGH or LOW $S_0$ or $S_1$ to CP	0 0			0 0		ns
$t_{S(H)}$ $t_{S(L)}$	Set-Up Time, HIGH or LOW I/O <sub>n</sub> , DS <sub>0</sub> , DS <sub>7</sub> to CP	3.5 3.5			4.0 4.0		ns
$t_{h(H)}$ $t_{h(L)}$	Hold Time, HIGH or LOW I/O <sub>n</sub> , DS <sub>0</sub> , DS <sub>7</sub> to CP	0 1.0			0 1.0		ns
$t_{w(H)}$ $t_{w(L)}$	CP Pulse Width, HIGH or LOW	5.0 4.5			5.0 4.5		ns
$t_{w(L)}$	MR Pulse Width LOW	4.5			4.5		ns
$t_{rec}$	Recovery Time MR to CP	4.0			4.0		ns

**Case 751D-03 DW Suffix  
20-Pin Plastic  
SO-20 (WIDE)**

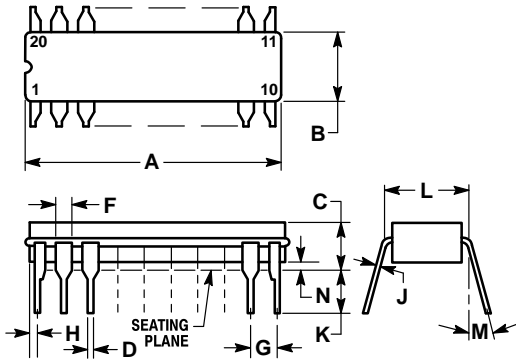


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. 751D-01, AND -02 OBSOLETE, NEW STANDARD 751D-03.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC	0.050 BSC		
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

**Case 732-03 J Suffix  
20-Pin Ceramic Dual In-Line**

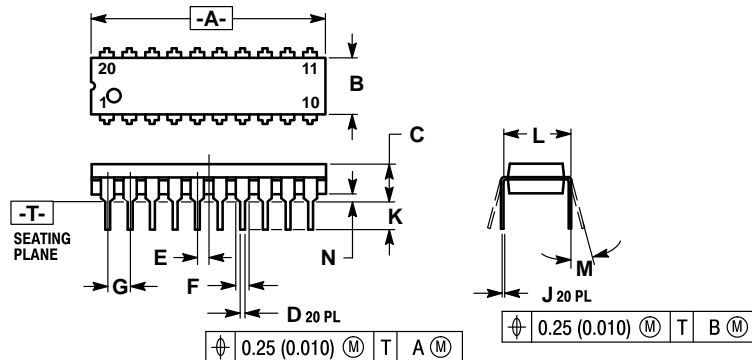


**NOTES:**

1. LEADS WITHIN 0.25 mm (0.010) DIA., TRUE POSITION AT SEATING PLANE, AT MAXIMUM MATERIAL CONDITION.
2. DIM L TO CENTER OF LEADS WHEN FORMED PARALLEL.
3. DIM A AND B INCLUDES MENISCUS.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	23.88	25.15	0.940	0.990
B	6.60	7.49	0.260	0.295
C	3.81	5.08	0.150	0.200
D	0.38	0.56	0.015	0.022
F	1.40	1.65	0.055	0.065
G	2.54 BSC	0.100 BSC		
H	0.51	1.27	0.020	0.050
J	0.20	0.30	0.008	0.012
K	3.18	4.06	0.125	0.160
L	7.62 BSC	0.300 BSC		
M	0°	15°	0°	15°
N	0.25	1.02	0.010	0.040


**Case 738-03 N Suffix  
20-Pin Plastic**



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION "L" TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
5. 738-02 OBSOLETE, NEW STANDARD 738-03.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	25.66	27.17	1.010	1.070
B	6.10	6.60	0.240	0.260
C	3.81	4.57	0.150	0.180
D	0.39	0.55	0.015	0.022
E	1.27 BSC	0.050 BSC		
F	1.27	1.77	0.050	0.070
G	2.54 BSC	0.100 BSC		
J	0.21	0.38	0.008	0.015
K	2.80	3.55	0.110	0.140
L	7.62 BSC	0.300 BSC		
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040

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