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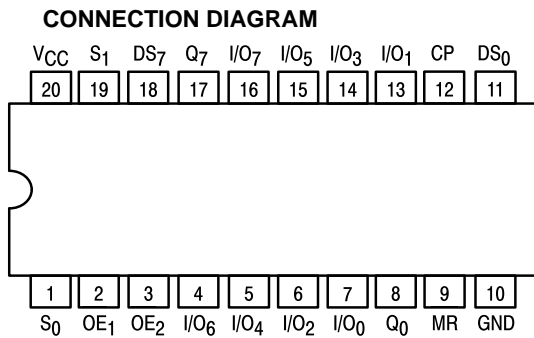


8-INPUT UNIVERSAL SHIFT/STORAGE REGISTER WITH COMMON PARALLEL I/O PINS

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 Q₀ and Q₇ to allow easy cascading. A separate active LOW Master Reset is used to reset the register.

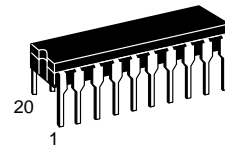
- Common I/O for Reduced Pin Count
- Four Operation Modes: Shift left, Shift Right, Load and Store
- Separate Shift Right Serial Input and Shift Left Serial Input for Easy Cascading
- 3-State Outputs for Bus Oriented Applications
- Input Clamp Diodes Limit High-Speed Termination Effects



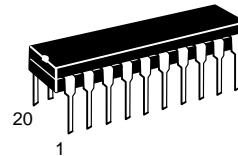
MC74F299

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

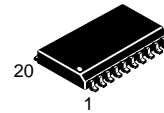
FAST™ SCHOTTKY TTL



**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 _{CC} | Supply Voltage | 74 | 4.5 | 5.0 | 5.5 | V |
| T _A | Operating Ambient Temperature Range | 74 | 0 | 25 | 70 | °C |
| I _{OH} | Output Current — High | 74 | | | -1.0/-3.0 | mA |
| I _{OL} | Output Current — Low | 74 | | | 20/24 | mA |

MC74F299

FUNCTION TABLE

| Inputs | | | | Response |
|--------|----------------|----------------|----|--|
| MR | S ₁ | S ₀ | CP | |
| L | X | X | X | Asynchronous Reset: Q ₀ –Q ₇ = LOW |
| H | H | H | ↑ | Parallel Load: I/O _n Q _n |
| H | L | H | ↑ | Shift Right: DS ₀ Q ₀ , Q ₀ Q ₁ , etc. |
| H | H | L | ↑ | Shift Left: DS ₇ Q ₇ , Q ₇ Q ₆ , 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 Q₀ and Q₇ 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 S₀ and S₁, 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. Q₀ and Q₇

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 \overline{OE}_1 or \overline{OE}_2 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 S₀ and S₁ 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 _{IH} | Input HIGH Voltage | 2.0 | | | V | Guaranteed Input HIGH Voltage | | |
| V _{IL} | Input LOW Voltage | | | 0.8 | V | Guaranteed Input LOW Voltage | | |
| V _{IK} | Input Clamp Diode Voltage | | | -1.2 | V | V _{CC} = MIN, I _{IN} = -18 mA | | |
| V _{OH} | Output HIGH Voltage | Q ₀ /Q ₇ | 74 | 2.5 | | V | I _{OH} = -1.0 mA | V _{CC} = 4.5 V |
| | | | 74 | 2.7 | | | | V _{CC} = 4.75 V |
| | | I/O | 74 | 2.7 | 3.4 | V | I _{OH} = -3.0 mA | V _{CC} = 4.75 V |
| | | | 74 | 2.4 | | | | V _{CC} = 4.5 V |
| V _{OL} | Output LOW Voltage | Q ₀ /Q ₇ | | 0.5 | V | I _{OL} = 20 mA | V _{CC} = MIN | |
| | | I/O | | 0.5 | | | | I _{OL} = 24 mA |
| I _{IH} | Input HIGH Current | Q ₀ /Q ₇ | | 20 | μA | V _{CC} = MAX, V _{IN} = 2.7 V | | |
| | | I/O | | 70 | | | | |
| | | Q ₀ /Q ₇ | | 0.1 | mA | V _{CC} = MAX | V _{IN} = 7.0 V | |
| | | I/O | | 1.0 | | | V _{IN} = 5.5 V | |
| I _{IL} | Input LOW Current | S ₀ , S ₁ | | -1.2 | mA | V _{CC} = MAX, V _{IN} = 0.5 V | | |
| | | Other Inputs | | -0.6 | | | | |
| I _{OZH} | Off-State Output Current, High-Level Voltage Applied | | | 70 | μA | V _{CC} = MAX | V _{OUT} = 2.7 V | |
| | | | | 1.0 | | | mA | V _{OUT} = 5.5 V |
| I _{OZL} | Off-State Output Current, Low-Level Voltage Applied | | | -0.6 | mA | V _{CC} = MAX, V _{OUT} = 0.5 V | | |
| I _{OS} | Output Short Circuit Current (Note 2) | -60 | | -150 | mA | V _{CC} = MAX | V _{OUT} = 0 V | |
| I _{CC} | 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

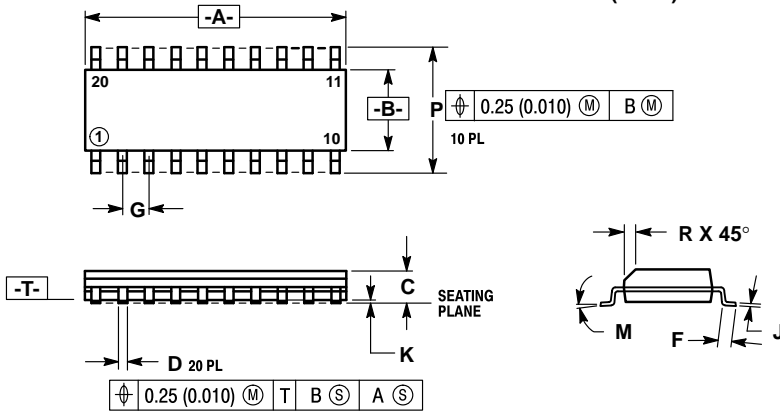
AC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | 74F | | 74F | | Unit |
|--------------------------------------|---|--|------------|--|------------|------|
| | | T _A = +25°C V _{CC} = +5.0 V C _L = 50 pF | | T _A = 0°C to +70°C V _{CC} = +5.0 V ±10% C _L = 50 pF | | |
| | | Min | Max | Min | Max | |
| f _{MAX} | Maximum Clock Frequency | 70 | | 70 | | MHz |
| t _{PLH} t _{PHL} | Propagation Delay CP to Q ₀ or Q ₇ | 3.5 4.5 | 7.5 8.0 | 3.5 4.5 | 8.5 8.5 | ns |
| t _{PLH} t _{PHL} | Propagation Delay CP to I/O _n | 3.5 4.0 | 9.0 9.0 | 3.5 4.0 | 10 10 | ns |
| t _{PHL} | Propagation Delay MR to Q ₀ or Q ₇ | 5.5 | 9.5 | 5.5 | 10.5 | ns |
| t _{PHL} | Propagation Delay MR to I/O _n | 5.5 | 10 | 5.5 | 10.5 | ns |
| t _{PZH} t _{PZL} | Output Enable Time to HIGH or LOW Level | 3.5 4.0 | 8.0 10 | 3.5 4.0 | 9.0 11 | ns |
| t _{PHZ} t _{PLZ} | 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°C V _{CC} = +5.0 V C _L = 50 pF | | | T _A = 0°C to +70°C V _{CC} = +5.0 V ±10% C _L = 50 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 _n , DS ₀ , DS ₇ to CP | 3.5 3.5 | | | 4.0 4.0 | | ns |
| t _{h(H)} t _{h(L)} | Hold Time, HIGH or LOW I/O _n , DS ₀ , DS ₇ 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 |

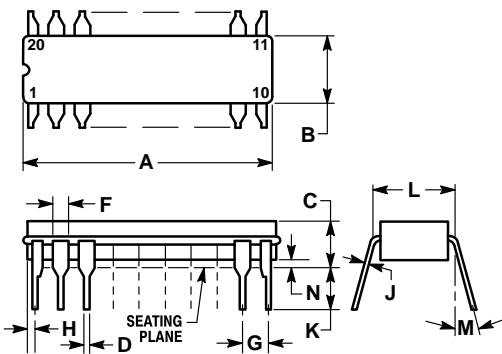
Case 751D-03 DW Suffix
20-Pin Plastic
SO-20 (WIDE)



- 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 |

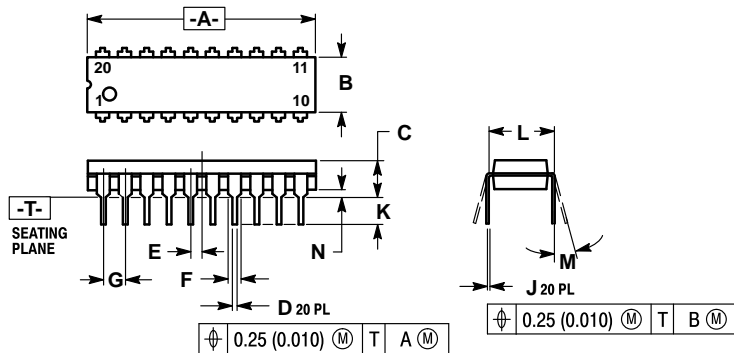
Case 732-03 J Suffix
20-Pin Ceramic Dual In-Line



- 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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