FAIRCHILD SEMICONDUCTOR™

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# 74F399
# Quad 2-Port Register

## General Description

The 74F399 is the logical equivalent of a quad 2-input multiplexer feeding into four edge-triggered flip-flops. A common Select input determines which of the two 4-bit words is accepted. The selected data enters the flip-flops on the rising edge of the clock.

## Features

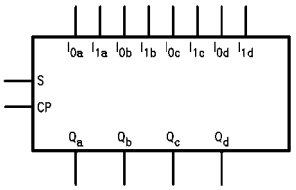
- Select inputs from two data sources
- Fully positive edge-triggered operation

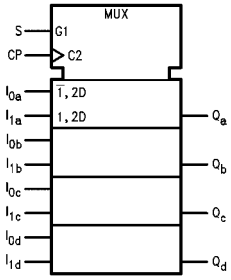
## Ordering Code:

| Order Number | Package Number | Package Description |
|---|---|---|
| 74F399SC | M16A | 16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow |
| 74F399SJ | M16D | 16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74F399PC | N16E | 16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide |

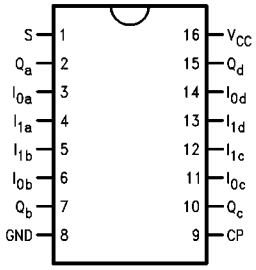
Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

## Logic Symbols




## Connection Diagram




## Unit Loading/Fan Out

| Pin Names | Description | U.L. HIGH/LOW | Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$ |
|---|---|---|---|
| S | Common Select Input | 1.0/1.0 | 20 µA/–0.6 mA |
| CP | Clock Pulse Input (Active Rising Edge) | 1.0/1.0 | 20 µA/–0.6 mA |
| $I_{0a}$–$I_{0d}$ | Data Inputs from Source 0 | 1.0/1.0 | 20 µA/–0.6 mA |
| $I_{1a}$–$I_{1d}$ | Data Inputs from Source 1 | 1.0/1.0 | 20 µA/–0.6 mA |
| $Q_a$–$Q_d$ | Register True Outputs | 50/33.3 | –1 mA/20 mA |

## Functional Description

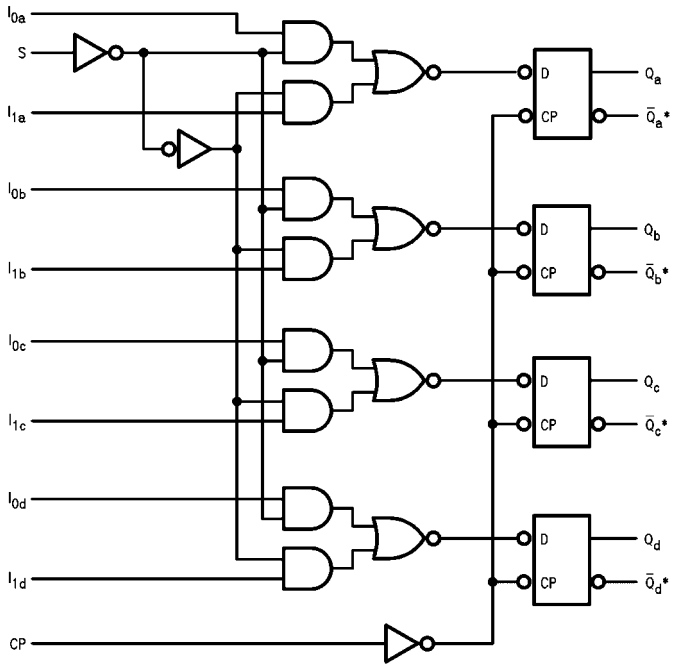
The 74F399 is a high-speed quad 2-port registers. They select four bits of data from either of two sources (Ports) under control of a common Select input (S). The selected data is transferred to a 4-bit output register synchronous with the LOW-to-HIGH transition of the Clock input (CP). The 4-bit D-type output register is fully edge-triggered. The Data inputs ($I_{0x}$, $I_{1x}$) and Select input (S) must be stable only a setup time prior to and hold time after the LOW-to-HIGH transition of the Clock input for predictable operation.

## Function Table

| Inputs | | | Outputs |
|---|---|---|---|
| **S** | **$I_0$** | **$I_1$** | **Q** |
| I | I | X | L |
| I | h | X | H |
| h | X | I | L |
| h | X | h | H |

H = HIGH Voltage Level
L = LOW Voltage Level
h = HIGH Voltage Level one setup time prior to the LOW-to-HIGH clock transition
I = LOW Voltage Level one setup time prior to the LOW-to-HIGH clock transition
X = Immaterial

## Logic Diagram




*F398 Only

Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

## 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 +150°C |
| $V_{CC}$ 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 +5.0 mA |
| Voltage Applied to Output | |
| in HIGH State (with $V_{CC}$ = 0V) | |
| Standard Output | −0.5V to $V_{CC}$ |
| 3-STATE Output | −0.5V to +5.5V |
| Current Applied to Output | |
| in LOW State (Max) | twice the rated $I_{OL}$(mA) |
| ESD Last Passing Voltage | |
| (Min)—74F399 | 4000V |

## Recommended Operating Conditions

| | |
|---|---|
| Free Air Ambient Temperature | 0°C to +70°C |
| Supply Voltage | +4.5V to +5.5V |

**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.

## DC Electrical Characteristics

| Symbol | Parameter | Min | Typ | Max | Units | $V_{CC}$ | Conditions |
|---|---|---|---|---|---|---|---|
| $V_{IH}$ | Input HIGH Voltage | 2.0 | | | V | | Recognized as a HIGH Signal |
| $V_{IL}$ | Input LOW Voltage | | | 0.8 | V | | Recognized as a LOW Signal |
| $V_{CD}$ | Input Clamp Diode Voltage | | | −1.2 | V | Min | $I_{IN}$ = −18 mA |
| $V_{OH}$ | Output HIGH 10% $V_{CC}$ | 2.5 | | | V | Min | $I_{OH}$ = −1 mA |
| | Voltage 5% $V_{CC}$ | 2.7 | | | | | $I_{OH}$ = −1 mA |
| $V_{OL}$ | Output LOW 10% $V_{CC}$ Voltage | | | 0.5 | V | Min | $I_{OL}$ = 20 mA |
| $I_{IH}$ | Input HIGH Current | | | 5.0 | µA | Max | $V_{IN}$ = 2.7V |
| $I_{BVI}$ | Input HIGH Current Breakdown Test | | | 7.0 | µA | Max | $V_{IN}$ = 7.0V |
| $I_{CEX}$ | Output HIGH Leakage Current | | | 50 | µA | Max | $V_{OUT}$ = $V_{CC}$ |
| $V_{ID}$ | Input Leakage Test | 4.75 | | | V | 0.0 | $I_{ID}$ = 1.9 µA All Other Pins Grounded |
| $I_{OD}$ | Output Leakage Circuit Current | | | 3.75 | µA | 0.0 | $V_{IOD}$ = 150 mV All Other Pins Grounded |
| $I_{IL}$ | Input LOW Current | | | −0.6 | mA | Max | $V_{IN}$ = 0.5V |
| $I_{OS}$ | Output Short-Circuit Current | −60 | | −150 | mA | Max | $V_{OUT}$ = 0V |
| $I_{CCH}$ | Power Supply Current | | 22 | 34 | mA | Max | $V_O$ = HIGH |
| $I_{CCL}$ | Power Supply Current | | 22 | 34 | mA | Max | $V_O$ = LOW |

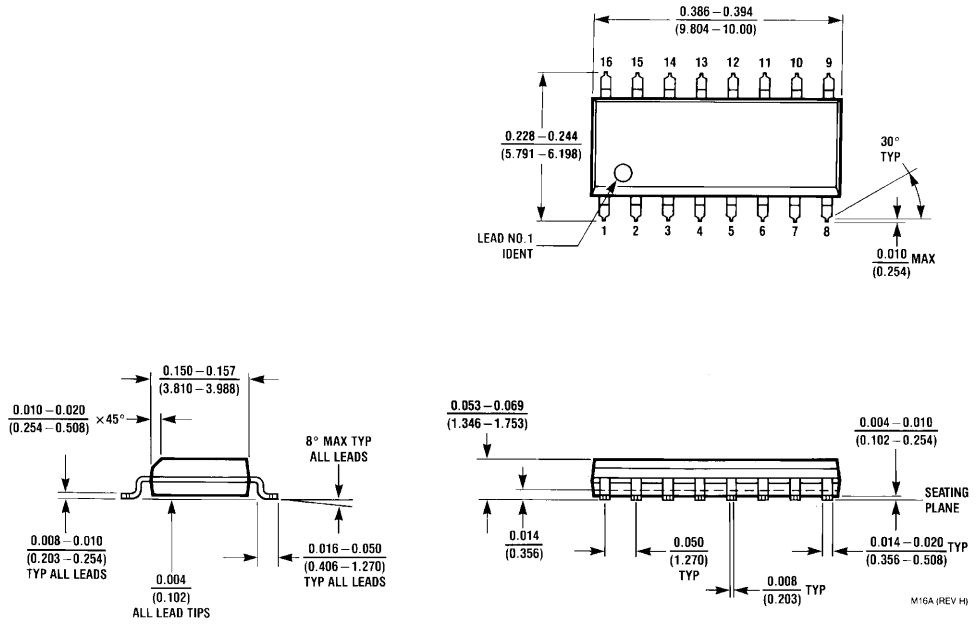
## AC Electrical Characteristics

| Symbol | Parameter | $T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF | | | $T_A = 0°C$ to $+70°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF | | Units |
|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Max | |
| $f_{MAX}$ | Input Clock Frequency | 100 | 140 | | 100 | | MHz |
| $t_{PLH}$ | Propagation Delay | 3.0 | 5.7 | 7.5 | 3.0 | 8.5 | ns |
| $t_{PHL}$ | CP to Q or $\overline{Q}$ | 3.0 | 6.8 | 9.0 | 3.0 | 10.0 | |

## AC Operating Requirements

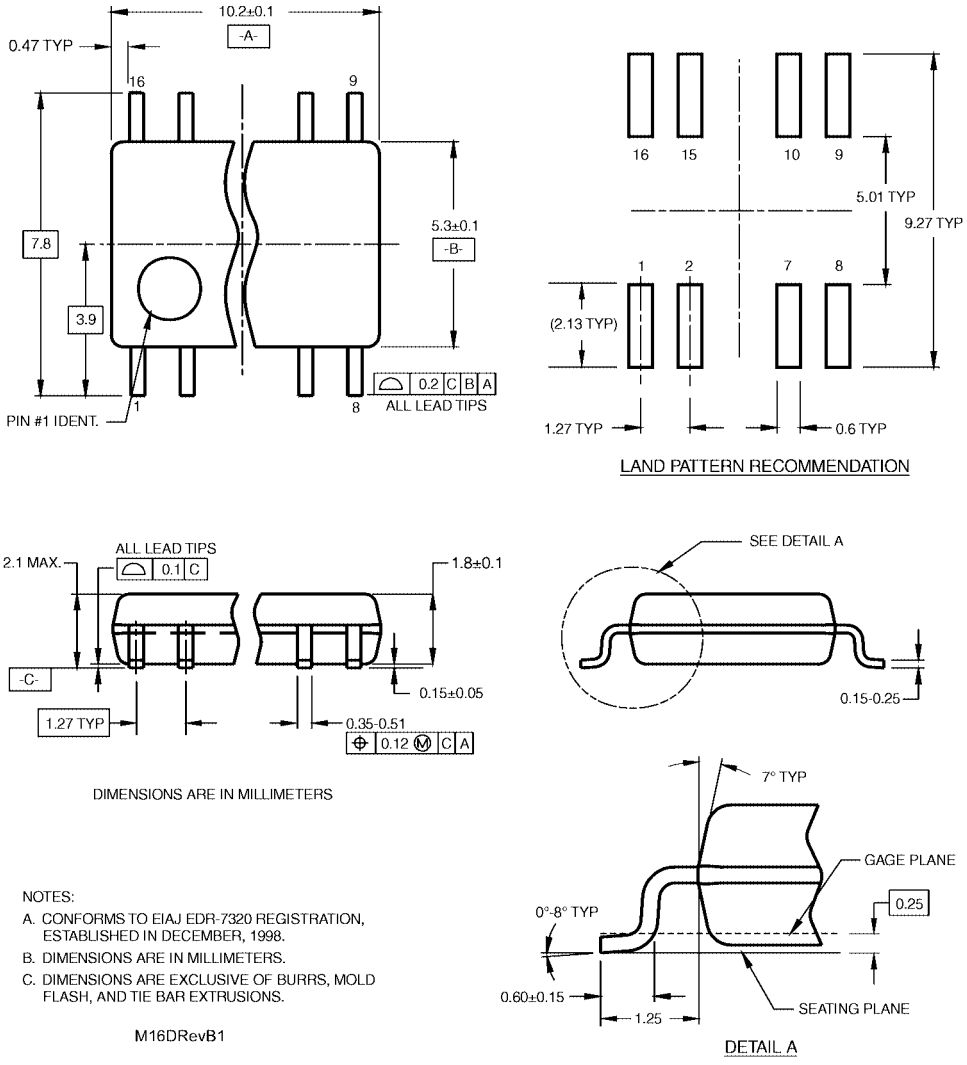
| Symbol | Parameter | $T_A = +25°C$, $V_{CC} = +5.0V$ | | $T_A = 0°C$ to $+70°C$, $V_{CC} = +5.0V$ | | Units |
|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | |
| $t_S(H)$ | Setup Time, HIGH or LOW | 3.0 | | 3.0 | | ns |
| $t_S(L)$ | $I_n$ to CP | 3.0 | | 3.0 | | |
| $t_H(H)$ | Hold Time, HIGH or LOW | 1.0 | | 1.0 | | ns |
| $t_H(L)$ | $I_n$ to CP | 1.0 | | 1.0 | | |
| $t_S(H)$ | Setup Time, HIGH or LOW | 7.5 | | 8.5 | | ns |
| $t_S(L)$ | S to CP | 7.5 | | 8.5 | | |
| $t_H(H)$ | Hold Time, HIGH or LOW | 0 | | 0 | | ns |
| $t_H(L)$ | S to CP | 0 | | 0 | | |
| $t_W(H)$ | CP Pulse Width | 4.0 | | 4.0 | | ns |
| $t_W(L)$ | HIGH or LOW | 5.0 | | 5.0 | | |

## Physical Dimensions inches (millimeters) unless otherwise noted




**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow**
**Package Number M16A**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)




NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.

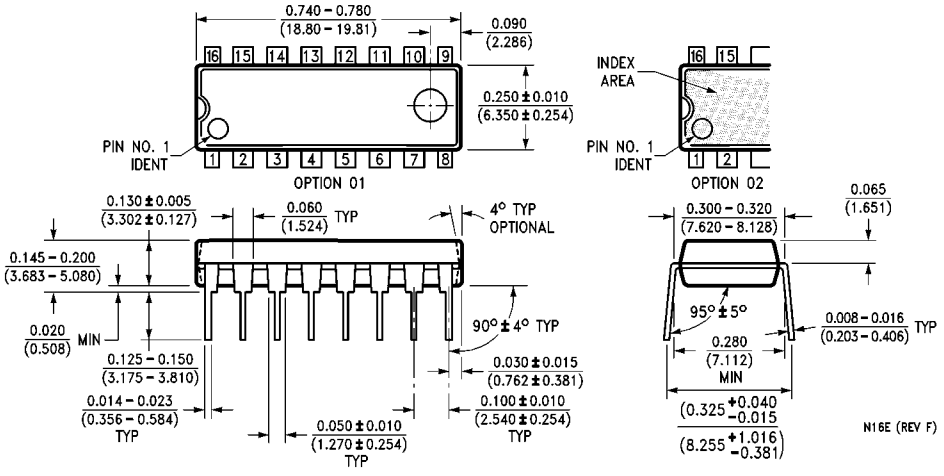
B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M16DRevB1

**16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide**
**Package Number M16D**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)




**16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide**
**Package Number N16E**