

# AC398 • ACT398 • AC399 • ACT399

## 54AC/74AC398 • 54ACT/74ACT398 54AC/74AC399 • 54ACT/74ACT399

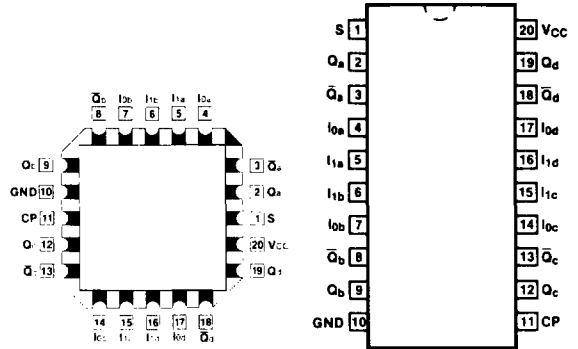
### Quad 2-Port Register

#### Description

The 'AC/'ACT398 and 'AC/'ACT399 are the logical equivalents 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-flop on the rising edge of the clock. The 'AC/'ACT399 is the 16-pin version of the 'AC/'ACT398, with only the Q outputs of the flip-flops available.

- Select Inputs from Two Data Sources
- Fully Positive Edge-Triggered Operation
- Both True and Complement
- Outputs—'AC/'ACT398
- Outputs Source/Sink 24 mA
- 'ACT398 and 'ACT399 have TTL-Compatible Inputs

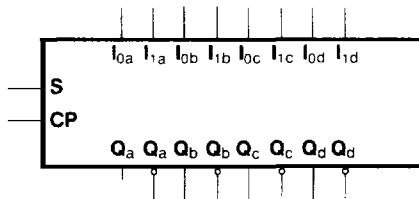
#### Connection Diagrams



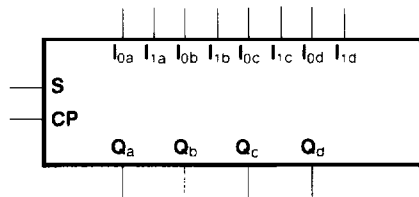
'AC/'ACT398

Ordering Code: See Section 6

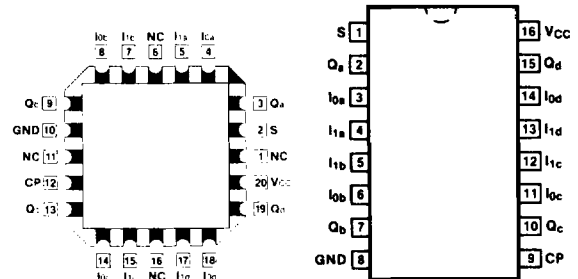
#### Logic Symbols



'AC/'ACT398



'AC/'ACT399



'AC/'ACT399

Pin Assignment  
for LCC

Pin Assignment  
for DIP, Flatpak and SOIC

#### Pin Names

- |                 |  |
|-----------------|--|
| S               | Common Select Input                          |
| CP              | Clock Pulse                                  |
| I0a - I0d       | Data Inputs from Source 0                    |
| I1a - I1d       | Data Inputs from Source 1                    |
| Qa - Qd         | Register True Outputs                        |
| Qa-bar - Qd-bar | Register Complementary Outputs ('AC/'ACT398) |

## Functional Description

The 'AC/ACT398 and 'AC/ACT399 are 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<sub>0x</sub>, I<sub>1x</sub>) 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. The 'AC/ACT398 has both Q and  $\bar{Q}$  outputs.

## Function Table

| Inputs |                |                |    | Outputs |             |
|--------|----------------|----------------|----|---------|-------------|
| S      | I <sub>0</sub> | I <sub>1</sub> | CP | Q       | $\bar{Q}$ * |
| L      | L              | X              | ⌋  | L       | H           |
| L      | H              | X              | ⌋  | H       | L           |
| H      | X              | L              | ⌋  | L       | H           |
| H      | X              | H              | ⌋  | H       | L           |

H = HIGH Voltage Level

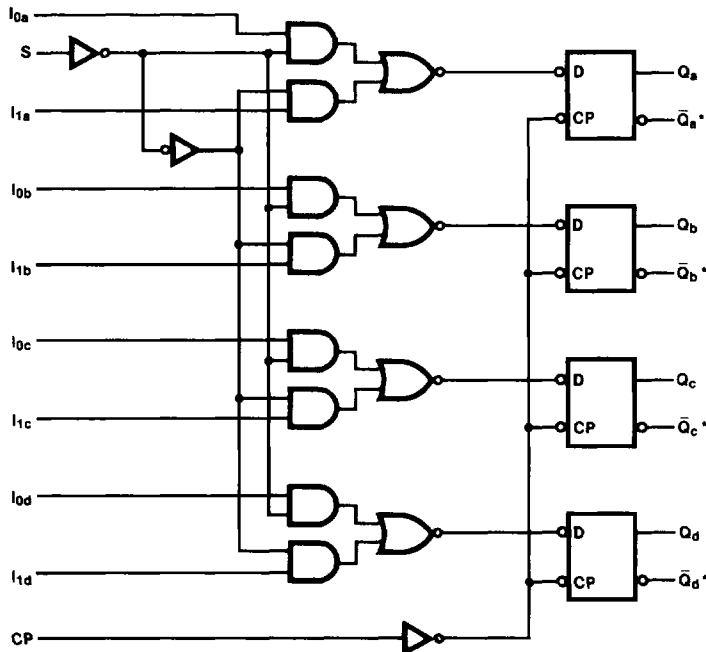
L = LOW Voltage Level

X = Immaterial

⌋ = LOW-to-HIGH Clock Transition

\* = 'AC/ACT398 only

## Logic Diagram



\*\*AC/ACT398 only

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

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## DC Characteristics (unless otherwise specified)

| Symbol             | Parameter  | 54AC/ACT | 74AC/ACT | Units | Conditions  |
|--------------------|--|----------|----------|-------|---|
| I <sub>CC</sub>    | Maximum Quiescent Supply Current                       | 160      | 80       | μA    | V <sub>IN</sub> = V <sub>CC</sub> or Ground,<br>V <sub>CC</sub> = 5.5 V,<br>T <sub>A</sub> = Worst Case |
| I <sub>CC</sub>    | Maximum Quiescent Supply Current                       | 8.0      | 8.0      | μA    | V <sub>IN</sub> = V <sub>CC</sub> or Ground,<br>V <sub>CC</sub> = 5.5 V,<br>T <sub>A</sub> = 25°C       |
| I <sub>CC(T)</sub> | Maximum Additional I <sub>CC</sub> /Input (ACT398/399) | 1.6      | 1.5      | mA    | V <sub>IN</sub> = V <sub>CC</sub> - 2.1 V<br>V <sub>CC</sub> = 5.5 V,<br>T <sub>A</sub> = Worst Case    |

## AC Characteristics

| Symbol           | Parameter  | V <sub>CC</sub> *<br>(V) | 74AC   |            |     | 54AC  |     | 74AC   |     | Units | Fig. No. |
|------------------|--|--------------------------|--|------------|-----|---|-----|--|-----|-------|----------|
|                  |  |                          | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |            |     | T <sub>A</sub> = -55°C<br>to +125°C<br>C <sub>L</sub> = 50 pF |     | T <sub>A</sub> = -40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF |     |       |          |
|                  |  |                          | Min  | Typ        | Max | Min   | Max | Min  | Max |       |          |
| f <sub>max</sub> | Input Clock Frequency                                  | 3.3,<br>5.0              |  | 180<br>160 |     |   |     |  | MHz | 3-3   |          |
| t <sub>PLH</sub> | Propagation Delay<br>CP to Q <sub>0</sub> or $\bar{Q}$ | 3.3<br>5.0               |  | 9.5<br>7.0 |     |   |     |  | ns  | 3-6   |          |
| t <sub>PHL</sub> | Propagation Delay<br>CP to Q <sub>0</sub> or $\bar{Q}$ | 3.3<br>5.0               |  | 8.5<br>6.0 |     |   |     |  | ns  | 3-6   |          |

\*Voltage Range 3.3 is 3.3 V ± 0.3 V

Voltage Range 5.0 is 5.0 V ± 0.5 V

Military parameters given herein are for general references only. For current military specifications and subgroup testing information please request Fairchild's Table I data sheet from your Fairchild sales engineer or account representative.

AC Operating Requirements

| Symbol | Parameter                                    | Vcc*<br>(V) | 74AC                     |                    | 54AC                                  |  | 74AC                                 |  | Units | Fig. No. |
|--------|--|-------------|--------------------------|--------------------|---------------------------------------|--|--------------------------------------|--|-------|----------|
|        |  |             | TA = +25°C<br>CL = 50 pF |                    | TA = -55°C<br>to +125°C<br>CL = 50 pF |  | TA = -40°C<br>to +85°C<br>CL = 50 pF |  |       |          |
|        |  |             | Typ                      | Guaranteed Minimum |                                       |  |                                      |  |       |          |
| ts     | Setup Time,<br>HIGH or LOW<br>In to CP       | 3.3         | 4.5                      |                    |                                       |  |                                      |  | ns    | 3-9      |
|        |  | 5.0         | 3.0                      |                    |                                       |  |                                      |  |       |          |
| th     | Hold Time,<br>HIGH or LOW<br>In to CP        | 3.3         | 0                        |                    |                                       |  |                                      |  | ns    | 3-9      |
|        |  | 5.0         | 0                        |                    |                                       |  |                                      |  |       |          |
| ts     | Setup Time,<br>HIGH or LOW<br>S to CP ('398) | 3.3         | 4.5                      |                    |                                       |  |                                      |  | ns    | 3-9      |
|        |  | 5.0         | 3.0                      |                    |                                       |  |                                      |  |       |          |
| ts     | Setup Time,<br>HIGH or LOW<br>S to CP ('399) | 3.3         | 4.5                      |                    |                                       |  |                                      |  | ns    | 3-9      |
|        |  | 5.0         | 3.0                      |                    |                                       |  |                                      |  |       |          |
| th     | Hold Time,<br>HIGH or LOW<br>S to CP         | 3.3         | -1.5                     |                    |                                       |  |                                      |  | ns    | 3-9      |
|        |  | 5.0         | -1.0                     |                    |                                       |  |                                      |  |       |          |
| tw     | CP Pulse Width<br>HIGH or LOW                | 3.3         | 5.5                      |                    |                                       |  |                                      |  | ns    | 3-6      |
|        |  | 5.0         | 4.0                      |                    |                                       |  |                                      |  |       |          |

\*Voltage Range 3.3 is 3.3 V ± 0.3 V  
Voltage Range 5.0 is 5.0 V ± 0.5 V

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AC Characteristics

| Symbol | Parameter                          | Vcc*<br>(V) | 74ACT                    |     |     | 54ACT                                 |     | 74ACT                                |     | Units | Fig. No. |
|--------|------------------------------------|-------------|--------------------------|-----|-----|---------------------------------------|-----|--------------------------------------|-----|-------|----------|
|        |                                    |             | TA = +25°C<br>CL = 50 pF |     |     | TA = -55°C<br>to +125°C<br>CL = 50 pF |     | TA = -40°C<br>to +85°C<br>CL = 50 pF |     |       |          |
|        |                                    |             | Min                      | Typ | Max | Min                                   | Max | Min                                  | Max |       |          |
| fmax   | Input Clock<br>Frequency           | 5.0         |                          | 160 |     |                                       |     |                                      | MHz | 3-3   |          |
| tPLH   | Propagation Delay<br>CP to Q or Q̄ | 5.0         |                          | 7.0 |     |                                       |     |                                      | ns  | 3-6   |          |
| tPHL   | Propagation Delay<br>CP to Q or Q̄ | 5.0         |                          | 6.0 |     |                                       |     |                                      | ns  | 3-6   |          |

\*Voltage Range 5.0 is 5.0 V ± 0.5 V

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## AC Operating Requirements

| Symbol | Parameter                                    | Vcc*<br>(V) | 74ACT                    | 54ACT                                 | 74ACT                                | Units | Fig.<br>No. |
|--------|--|-------------|--------------------------|---------------------------------------|--------------------------------------|-------|-------------|
|        |  |             | TA = +25°C<br>CL = 50 pF | TA = -55°C<br>to +125°C<br>CL = 50 pF | TA = -40°C<br>to +85°C<br>CL = 50 pF |       |             |
|        |  |             | Typ                      | Guaranteed Minimum                    |                                      |       |             |
| ts     | Setup Time,<br>HIGH or LOW<br>In to CP       | 5.0         | 3.0                      |                                       |                                      | ns    | 3-9         |
| th     | Hold Time,<br>HIGH or LOW<br>In to CP        | 5.0         | 0                        |                                       |                                      | ns    | 3-9         |
| ts     | Setup Time,<br>HIGH or LOW<br>S to CP (*398) | 5.0         | 3.0                      |                                       |                                      | ns    | 3-9         |
| ts     | Setup Time,<br>HIGH or LOW<br>S to CP (*399) | 5.0         | 3.0                      |                                       |                                      | ns    | 3-9         |
| th     | Hold Time,<br>HIGH or LOW<br>S to CP         | 5.0         | -1.0                     |                                       |                                      | ns    | 3-9         |
| tw     | CP Pulse Width<br>HIGH or LOW                | 5.0         | 5.5                      |                                       |                                      | ns    | 3-6         |

\*Voltage Range 5.0 is 5.0 V ± 0.5 V

Military parameters given herein are for general references only. For current military specifications and subgroup testing information please request Fairchild's Table I data sheet from your Fairchild sales engineer or account representative.

## Capacitance

| Symbol | Parameter                        | 54/74AC/ACT | Units | Conditions  |
|--------|----------------------------------|-------------|-------|-------------|
|        |                                  | Typ         |       |             |
| CIN    | Input Capacitance                | 4.5         | pF    | Vcc = 5.5 V |
| CPD    | Power Dissipation<br>Capacitance |             | pF    | Vcc = 5.5 V |