54AC/74AC823 • 54ACT/74ACT823
54AC/74AC824 • 54ACT/74ACT824

9-Bit D-Type Flip-Flop

Description

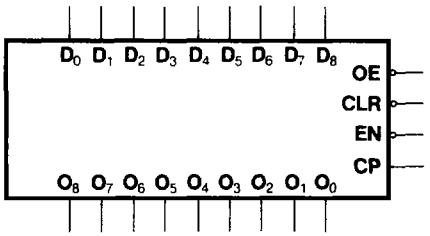
The 'AC/'ACT823 and 'AC/'ACT824 are 9-bit buffered registers. They feature Clock Enable and Clear which are ideal for parity bus interfacing in high performance microprogramming systems. The 'AC/'ACT 823 offers noninverting outputs and the 'AC/'ACT824 offers inverting outputs.

The 'AC/'ACT823 is fully compatible with AMD's AM29823.

- **Outputs Source/Sink 24 mA**
- **3-State Outputs for Bus Interfacing**
- **Inputs and Outputs are on Opposite Sides**
- **'ACT823 and 'ACT824 have TTL-Compatible Inputs**

Ordering Code: See Section 6

Logic Symbol ('AC/'ACT823)*

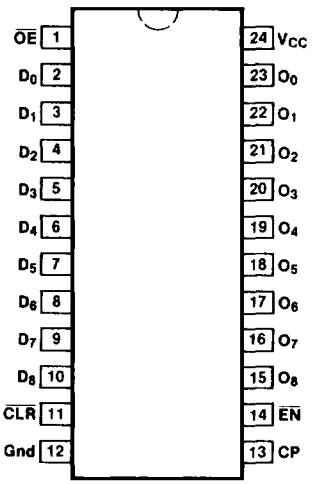


*The 'AC/'ACT824 has inverting outputs.

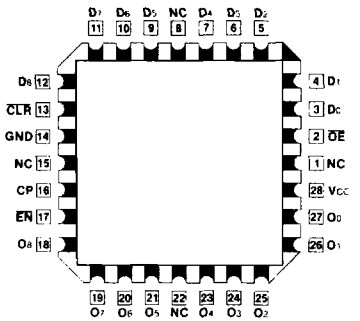
Pin Names

D_0 - D_8	Data Inputs
O_0 - O_8	Data Outputs ('AC/'ACT823)
$\overline{O}_0$ - $\overline{O}_8$	Data Outputs ('AC/'ACT824)
$\overline{OE}$	Output Enable
$\overline{CLR}$	Clear
CP	Clock Input
$\overline{EN}$	Clock Enable

Connection Diagrams



Pin Assignment for DIP, Flatpak and SOIC



Pin Assignment for LCC

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Functional Description

The 'AC/'ACT823 and 'AC/'ACT824 consist of nine D-type edge-triggered flip-flops. These have 3-state outputs for bus systems organized with inputs and outputs on opposite sides. The buffered clock (CP) and buffered Output Enable ($\overline{OE}$) are common to all flip-flops. The flip-flops will store the state of their individual D inputs that meet the setup and hold time requirements on the LOW-to-HIGH CP transition. With $\overline{OE}$ LOW, the contents of the flip-flops are available at the outputs. When $\overline{OE}$ is HIGH, the outputs go to the high impedance state. Operation of the $\overline{OE}$ input does not affect the state of the flip-flops. In addition to the Clock and Output Enable pins, there are Clear ($\overline{CLR}$) and Clock Enable ($\overline{EN}$) pins. These devices are ideal for parity bus interfacing in high performance systems.

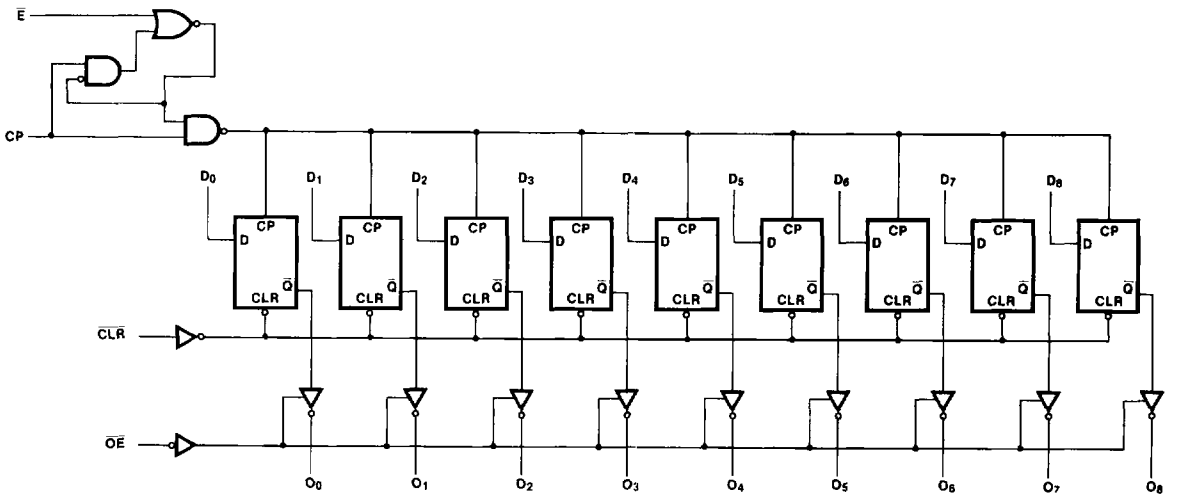
When $\overline{CLR}$ is LOW and $\overline{OE}$ is LOW, the outputs are LOW. When $\overline{CLR}$ is HIGH, data can be entered into the flip-flops. When $\overline{EN}$ is LOW, data on the inputs is transferred to the outputs on the LOW-to-HIGH clock transition. When the $\overline{EN}$ is HIGH, the outputs do not change state, regardless of the data or clock input transitions.

Function Table

Inputs					Internal	Outputs		Function
$\overline{OE}$	$\overline{CLR}$	$\overline{EN}$	CP	D	Q	O ('823)	$\overline{O}$ ('824)	
H	X	L	⌐	L	L	Z	Z	High Z
H	X	L	⌐	H	H	Z	Z	High Z
H	L	X	X	X	L	Z	Z	Clear
L	L	X	X	X	L	L	L	Clear
H	H	H	X	X	NC	Z	Z	Hold
L	H	H	X	X	NC	NC	NC	Hold
H	H	L	⌐	L	L	Z	Z	Load
H	H	L	⌐	H	H	Z	Z	Load
L	H	L	⌐	L	L	L	H	Load
L	H	L	⌐	H	H	H	L	Load

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance
⌐ = LOW-to-HIGH Transition
NC = No Change

Logic Diagram ('AC/'ACT823)



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays. The 'AC/'ACT824 also has the same logic diagram with inverting outputs.

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DC Characteristics (unless otherwise specified)

Symbol	Parameter	54AC/ACT	74AC/ACT	Units	Conditions
I_{CC}	Maximum Quiescent Supply Current	160	80	μA	$V_{IN} = V_{CC}$ or Ground, $V_{CC} = 5.5$ V, T_A = Worst Case
I_{CC}	Maximum Quiescent Supply Current	8.0	8.0	μA	$V_{IN} = V_{CC}$ or Ground, $V_{CC} = 5.5$ V, $T_A = 25°C$
I_{CCT}	Maximum Additional Icc/Input ('ACT823/824)	1.6	1.5	mA	$V_{IN} = V_{CC} - 2.1$ V, $V_{CC} = 5.5$ V, T_A = Worst Case

AC Characteristics

Symbol	Parameter	Vcc* (V)	74AC $T_A = +25°C$, $C_L = 50$ pF			54AC $T_A = -55°C$ to $+125°C$, $C_L = 50$ pF		74AC $T_A = -40°C$ to $+85°C$, $C_L = 50$ pF		Units	Fig. No.
			Min	Typ	Max	Min	Max	Min	Max		
f_{max}	Maximum Clock Frequency	3.3 5.0		100 125						MHz	3-3
t_{PLH}	Propagation Delay CP to O_n	3.3 5.0		9.5 6.5						ns	3-6
t_{PHL}	Propagation Delay CP to O_n	3.3 5.0		9.5 6.5						ns	3-6
t_{PHL}	Propagation Delay $\overline{CLR}$ to O_n	3.3 5.0		14.5 10.5						ns	3-6
t_{PZH}	Output Enable Time $\overline{OE}$ to O_n	3.3 5.0		7.5 5.5						ns	3-7
t_{PZL}	Output Enable Time $\overline{OE}$ to O_n	3.3 5.0		8.0 6.0						ns	3-8
t_{PHZ}	Output Disable Time $\overline{OE}$ to O_n	3.3 5.0		10.5 7.5						ns	3-7
t_{PLZ}	Output Disable Time $\overline{OE}$ to O_n	3.3 5.0		8.5 6.0						ns	3-8

*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* (V)	74AC $T_A = +25°C$, $C_L = 50$ pF		54AC $T_A = -55°C$ to $+125°C$, $C_L = 50$ pF	74AC $T_A = -40°C$ to $+85°C$, $C_L = 50$ pF	Units	Fig. No.
			Typ	Guaranteed Minimum				
t_s	Setup Time, HIGH or LOW D_n to CP	3.3 5.0	3.0 2.0				ns	3-9
t_h	Hold Time, HIGH or LOW D_n to CP	3.3 5.0	2.0 1.5				ns	3-9
t_s	Setup Time, HIGH or LOW $\overline{EN}$ to CP	3.3 5.0	3.0 2.0				ns	3-9
t_h	Hold Time, HIGH or LOW $\overline{EN}$ to CP	3.3 5.0	2.0 1.5				ns	3-9
t_w	CP Pulse Width HIGH or LOW	3.3 5.0	3.5 2.5				ns	3-6
t_w	$\overline{CLR}$ Pulse Width, LOW	3.3 5.0	5.0 3.5				ns	3-6
t_{rec}	$\overline{CLR}$ to CP Recovery Time	3.3 5.0	2.0 1.5				ns	3-9

*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* (V)	74ACT $T_A = +25°C$, $C_L = 50$ pF			54ACT $T_A = -55°C$ to $+125°C$, $C_L = 50$ pF		74ACT $T_A = -40°C$ to $+85°C$, $C_L = 50$ pF		Units	Fig. No.
			Min	Typ	Max	Min	Max	Min	Max		
f_{max}	Maximum Clock Frequency	5.0		110						MHz	3-3
t_{PLH}	Propagation Delay CP to O_n	5.0		8.0						ns	3-6
t_{PHL}	Propagation Delay CP to O_n	5.0		8.0						ns	3-6
t_{PHL}	Propagation Delay $\overline{CLR}$ to O_n	5.0		12.0						ns	3-6
t_{PZH}	Output Enable Time $\overline{OE}$ to O_n	5.0		7.0						ns	3-7
t_{PZL}	Output Enable Time $\overline{OE}$ to O_n	5.0		7.5						ns	3-8
t_{PHZ}	Output Disable Time $\overline{OE}$ to O_n	5.0		10.0						ns	3-7
t_{PLZ}	Output Disable Time $\overline{OE}$ to O_n	5.0		8.5						ns	3-8

*Voltage Range 5.0 is 5.0 V ± 0.5 V

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AC Operating Requirements

Symbol	Parameter	Vcc* (V)	74ACT $T_A = +25°C$, $C_L = 50$ pF		54ACT $T_A = -55°C$ to $+125°C$, $C_L = 50$ pF	74ACT $T_A = -40°C$ to $+85°C$, $C_L = 50$ pF	Units	Fig. No.
			Typ	Guaranteed Minimum				
t_s	Setup Time, HIGH or LOW D_n to CP	5.0	2.0				ns	3-9
t_h	Hold Time, HIGH or LOW D_n to CP	5.0	1.0				ns	3-9
t_s	Setup Time, HIGH or LOW $\overline{EN}$ to CP	5.0	2.0				ns	3-9
t_h	Hold Time, HIGH or LOW $\overline{EN}$ to CP	5.0	1.5				ns	3-9
t_w	CP Pulse Width HIGH or LOW	5.0	3.0				ns	3-6
t_w	$\overline{CLR}$ Pulse Width, LOW	5.0	4.0				ns	3-6
t_{rec}	$\overline{CLR}$ to CP Recovery Time	5.0	1.5				ns	3-9

*Voltage Range 5.0 is 5.0 V ± 0.5 V

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Capacitance

Symbol	Parameter	54/74AC/ACT Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	$V_{CC} = 5.5$ V
C_{PD}	Power Dissipation Capacitance		pF	$V_{CC} = 5.5$ V