# **Octal Buffer/Line Driver** with 3-State Outputs

The MC74AC573/74ACT573 is a high–speed octal latch with buffered common Latch Enable (LE) and buffered common Output Enable ( $\overline{\text{OE}}$ ) inputs.

The MC74AC573/74ACT573 is functionally identical to the MC74AC373/74ACT373 but has inputs and outputs on opposite sides.

### Features

- Inputs and Outputs on Opposite Sides of Package Allowing Easy Interface with Microprocessors
- Useful as Input or Output Port for Microprocessors
- Functionally Identical to MC74AC373/74ACT373
- 3-State Outputs for Bus Interfacing
- Outputs Source/Sink 24 mA
- 'ACT573 Has TTL Compatible Inputs
- These are Pb–Free Devices

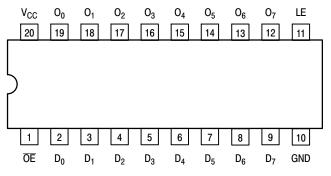


Figure 1. Pinout 20–Lead Packages Conductors (Top View)

#### **PIN ASSIGNMENT**

PIN	FUNCTION
D <sub>0</sub> -D <sub>7</sub>	Data Inputs
LE	Latch Enable Input
OE	3-State Output Enable Input
0 <sub>0</sub> -0 <sub>7</sub>	3-State Latch Outputs

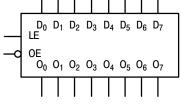
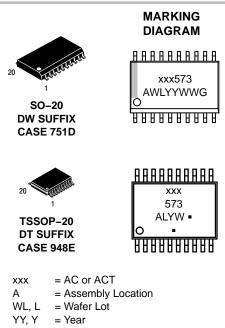


Figure 2. Logic Symbol



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WW, W = Work Week

G or • = Pb–Free Package

(Note: Microdot may be in either location)

#### **ORDERING INFORMATION**

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

#### TRUTH TABLE

	Inputs					
OE	LE	D <sub>n</sub>	O <sub>n</sub>			
L	Н	Н	Н			
L	н	L	L			
L	L	Х	O <sub>0</sub>			
н	х	х	Z			

H = HIGH Voltage Level

L = LOW Voltage Level

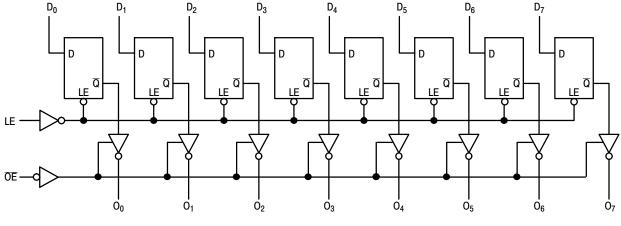
Z = High Impedance

X = Immaterial

O<sub>0</sub> = Previous O<sub>0</sub> before LOW-to-HIGH Transition of Clock

#### **Functional Description**

The MC74AC573/74ACT574 contains eight D-type latches with 3-state output buffers. When the Latch Enable (LE) input is HIGH, data on the  $D_n$  inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is LOW the latches store the information that was present on the D inputs a setup time preceding the HIGH-to-LOW transition of LE. The 3-state buffers are controlled by the Output Enable ( $\overline{OE}$ ) input. When  $\overline{OE}$  is LOW, the buffers are enabled. When  $\overline{OE}$  is HIGH the buffers are in the high impedance mode but this does not interfere with entering new data into the latches.



NOTE: That this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Figure 3. Logic Diagram

#### MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage (Referenced to GND)	–0.5 to V <sub>CC</sub> +0.5	V
V <sub>OUT</sub>	DC Output Voltage (Referenced to GND) (Note 1)	–0.5 to V <sub>CC</sub> +0.5	V
Ι <sub>ΙΚ</sub>	DC Input Diode Current	±20	mA
I <sub>OK</sub>	DC Output Diode Current	±50	mA
I <sub>OUT</sub>	DC Output Sink/Source Current	±50	mA
I <sub>CC</sub>	DC Supply Current, per Output Pin	±50	mA
I <sub>GND</sub>	DC Ground Current, per Output Pin	±100	mA
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
TL	Lead temperature, 1 mm from Case for 10 Seconds	260	°C
Τ <sub>J</sub>	Junction Temperature Under Bias	140	°C
$\theta_{JA}$	Thermal Resistance (Note 2) SOIO TSSOF		°C/W
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating Oxygen Index: 30% – 35%	UL 94 V–0 @ 0.125 in	
V <sub>ESD</sub>	ESD Withstand Voltage Human Body Model (Note 3 Machine Model (Note 4 Charged Device Model (Note 5	) > 200	V
I <sub>Latchup</sub>	Latchup Performance Above V <sub>CC</sub> and Below GND at 85°C (Note 6	) ±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1.

 $I_{OUT}$  absolute maximum rating must be observed. The package thermal impedance is calculated in accordance with JESD 51–7. 2.

3. Tested to EIA/JESD22-A114-A.

4. Tested to EIA/JESD22-A115-A.

Tested to JESD22-C101-A. 5.

6. Tested to EIA/JESD78.

#### **RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter		Min	Тур	Max	Unit
		′AC	2.0	5.0	6.0	
V <sub>CC</sub>	Supply Voltage	′ACT	4.5	5.0	5.5	V
V <sub>IN</sub> , V <sub>OUT</sub>	DC Input Voltage, Output Voltage (Ref. to GND)		0	-	V <sub>CC</sub>	V
		V <sub>CC</sub> @ 3.0 V	_	150	-	
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V <sub>CC</sub> @ 4.5 V	_	40	-	ns/V
		V <sub>CC</sub> @ 5.5 V	_	25	-	
	Input Rise and Fall Time (Note 2)	V <sub>CC</sub> @ 4.5 V	_	10	-	
t <sub>r</sub> , t <sub>f</sub>	'ACT Devices except Schmitt Inputs	V <sub>CC</sub> @ 5.5 V	_	8.0	-	ns/V
T <sub>A</sub>	Operating Ambient Temperature Range		-40	25	85	°C
I <sub>OH</sub>	Output Current – High		-	-	-24	mA
I <sub>OL</sub>	Output Current – Low		_	_	24	mA

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

1.  $V_{IN}$  from 30% to 70%  $V_{CC}$ ; see individual Data Sheets for devices that differ from the typical input rise and fall times. 2.  $V_{IN}$  from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

#### **DC CHARACTERISTICS**

			74	AC	74AC		
Symbol	Parameter	V <sub>CC</sub> (V)	T <sub>A</sub> = -	+25°C	T <sub>A</sub> = –40°C to +85°C	Unit	Conditions
			Тур	Guar	anteed Limits		
V <sub>IH</sub>	Minimum High Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V	$V_{OUT} = 0.1 V$ or $V_{CC} - 0.1 V$
V <sub>IL</sub>	Maximum Low Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	v	$V_{OUT} = 0.1 V$ or $V_{CC} - 0.1 V$
V <sub>OH</sub>	Minimum High Level Output Voltage	3.0 4.5 5.5	2.99 4.49 5.49	2.9 4.4 5.4	2.9 4.4 5.4	v	I <sub>OUT</sub> = -50 μA
		3.0 4.5 5.5	- - -	2.56 3.86 4.86	2.46 3.76 4.76	V	$V_{IN} = V_{IL} \text{ or } V_{IH}$ -12 mA $I_{OH}$ -24 mA -24 mA
V <sub>OL</sub>	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V	I <sub>OUT</sub> = 50 μA
		3.0 4.5 5.5		0.36 0.36 0.36	0.44 0.44 0.44	V	$\label{eq:VIN} \begin{array}{c} {}^{*}V_{IN} = V_{IL} \text{ or } V_{IH} \\ 12 \text{ mA} \\ I_{OL} \qquad 24 \text{ mA} \\ 24 \text{ mA} \end{array}$
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μΑ	$V_{I} = V_{CC}, \text{ GND}$
I <sub>OZ</sub>	Maximum 3–State Current	5.5	_	±0.5	±5.0	μΑ	
I <sub>OLD</sub>	†Minimum Dynamic	5.5	-	-	75	mA	V <sub>OLD</sub> = 1.65 V Max
I <sub>OHD</sub>	Output Current	5.5	-	-	-75	mA	V <sub>OHD</sub> = 3.85 V Min
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	-	8.0	80	μΑ	$V_{IN} = V_{CC}$ or GND

NOTE:  $I_{IN}$  and  $I_{CC} @ 3.0$  V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>. \*All outputs loaded; thresholds on input associated with output under test. †Maximum test duration 2.0 ms, one output loaded at a time.

				74AC		74	AC		
Symbol	Parameter	V <sub>CC</sub> * (V)		<sub>A</sub> = +25° C <sub>L</sub> = 50 p		T <sub>A</sub> = - to +8 C <sub>L</sub> = 5	85°C	Unit	Fig. No.
			Min	Тур	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay D <sub>n</sub> to O <sub>n</sub>	3.3 5.0	2.5 2.5	-	13.0 10.0	2.0 2.0	15.0 11.5	ns	3–5
t <sub>PHL</sub>	Propagation Delay D <sub>n</sub> to O <sub>n</sub>	3.3 5.0	2.5 2.5		12.0 9.5	2.0 2.0	14.0 11.0	ns	3–5
t <sub>PLH</sub>	Propagation Delay LE to O <sub>n</sub>	3.3 5.0	2.5 2.5	-	13.0 9.5	2.0 2.0	15.0 11.0	ns	3–6
t <sub>PHL</sub>	Propagation Delay LE to O <sub>n</sub>	3.3 5.0	2.5 2.5	-	12.0 8.5	2.0 2.0	14.0 10.0	ns	3–6
t <sub>PZH</sub>	Output Enable Time	3.3 5.0	2.5 2.5	-	11.0 9.0	2.0 2.0	12.0 10.0	ns	3–7
t <sub>PZL</sub>	Output Enable Time	3.3 5.0	2.5 2.5	-	11.0 8.5	2.0 2.0	12.5 9.5	ns	3–8
t <sub>PHZ</sub>	Output Disable Time	3.3 5.0	2.5 2.5	-	12.5 11.0	2.0 2.0	13.5 12.0	ns	3–7
t <sub>PLZ</sub>	Output Disable Time	3.3 5.0	2.5 2.5	-	9.5 8.0	2.0 2.0	10.5 9.0	ns	3–8

#### AC CHARACTERISTICS (For Figures and Waveforms - See Section 3)

\*Voltage Range 3.3 V is 3.3 V  $\pm 0.3$  V. Voltage Range 5.0 V is 5.0 V  $\pm 0.5$  V.

#### AC OPERATING REQUIREMENTS

			74AC T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		74AC		
Symbol	Parameter	V <sub>CC</sub> * (V)			$ \begin{array}{l} T_{A}=+25^{\circ}C \\ C_{L}=50 \ pF \end{array} \begin{array}{c} T_{A}=-40^{\circ}C \\ to \ +85^{\circ}C \\ C_{L}=50 \ pF \end{array} $		Unit
			Тур	Guarantee	d Minimum		
ts	Setup Time, HIGH or LOW D <sub>n</sub> to LE	3.3 5.0	-	3.5 3.0	4.0 3.5	ns	3–9
t <sub>h</sub>	Hold Time, HIGH or LOW D <sub>n</sub> to LE	3.3 5.0	-	2.0 2.0	2.0 2.0	ns	3–9
t <sub>w</sub>	LE Pulse Width, HIGH	3.3 5.0		6.0 4.0	7.0 5.0	ns	3–6

\*Voltage Range 3.3 V is 3.3 V  $\pm 0.3$  V. Voltage Range 5.0 V is 5.0 V  $\pm 0.5$  V.

#### **DC CHARACTERISTICS**

			744	СТ	74ACT		
Symbol	Parameter	V <sub>CC</sub> (V)	T <sub>A</sub> = -	+25°C	T <sub>A</sub> = –40°C to +85°C	Unit	Conditions
			Typ Guara		anteed Limits		
V <sub>IH</sub>	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	$V_{OUT} = 0.1 V$ or $V_{CC} - 0.1 V$
V <sub>IL</sub>	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	$V_{OUT} = 0.1 V$ or $V_{CC} - 0.1 V$
V <sub>OH</sub>	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V	I <sub>OUT</sub> = -50 μA
		4.5 5.5		3.86 4.86	3.76 4.76	V	$V_{IN} = V_{IL} \text{ or } V_{IH}$ -24 mA $I_{OH}$ -24 mA
V <sub>OL</sub>	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I <sub>OUT</sub> = 50 μA
		4.5 5.5		0.36 0.36	0.44 0.44	V	$V_{IN} = V_{IL} \text{ or } V_{IH}$ 24 mA $I_{OL}$ 24 mA
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μΑ	$V_{I} = V_{CC}, GND$
$\Delta I_{CCT}$	Additional Max. I <sub>CC</sub> /Input	5.5	0.6	-	1.5	mA	$V_{I} = V_{CC} - 2.1 V$
I <sub>OZ</sub>	Maximum 3-State Current	5.5	_	±0.5	±5.0	μΑ	$V_{I} (OE) = V_{IL}, V_{IH}$ $V_{I} = V_{CC}, GND$ $V_{O} = V_{CC}, GND$
I <sub>OLD</sub>	†Minimum Dynamic	5.5	-	-	75	mA	$V_{OLD}$ = 1.65 V Max
I <sub>OHD</sub>	Output Current	5.5	-	-	-75	mA	V <sub>OHD</sub> = 3.85 V Min
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	_	8.0	80	μΑ	$V_{IN} = V_{CC}$ or GND

\*All outputs loaded; thresholds on input associated with output under test. †Maximum test duration 2.0 ms, one output loaded at a time.

#### AC CHARACTERISTICS (For Figures and Waveforms – See Section 3)

				74ACT		74A	СТ		
Symbol	Parameter	V <sub>CC</sub> * (V)	T, C	₄ = +25° L = 50 p	C F	T <sub>A</sub> = - to +8 C <sub>L</sub> = 5		Unit	Fig. No.
			Min	Тур	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay D <sub>n</sub> to O <sub>n</sub>	5.0	2.5	I	10.5	2.0	12	ns	3–5
t <sub>PHL</sub>	Propagation Delay D <sub>n</sub> to O <sub>n</sub>	5.0	2.5	I	10.5	2.0	12	ns	3–5
t <sub>PLH</sub>	Propagation Delay LE to O <sub>n</sub>	5.0	3.0	I	10.5	2.5	12	ns	3–6
t <sub>PHL</sub>	Propagation Delay LE to O <sub>n</sub>	5.0	2.5	I	9.5	2.0	10.5	ns	3–6
t <sub>PZH</sub>	Output Enable Time	5.0	2.0	1	10	1.5	11	ns	3–7
t <sub>PZL</sub>	Output Enable Time	5.0	1.5	-	9.5	1.5	10.5	ns	3–8
t <sub>PHZ</sub>	Output Disable Time	5.0	2.5	-	11	1.5	12.5	ns	3–7
t <sub>PLZ</sub>	Output Disable Time	5.0	1.5	-	8.5	1.0	9.5	ns	3–8

\*Voltage Range 5.0 V is 5.0 V  $\pm 0.5$  V.

#### AC OPERATING REQUIREMENTS

				74ACT	74ACT				
Symbol	Parameter	V <sub>CC</sub> * (V)	T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		$I_A = +25^{\circ}C$ to +8		T <sub>A</sub> = −40°C to +85°C C <sub>L</sub> = 50 pF	Unit	Fig. No.
			Тур	Guarantee	d Minimum				
t <sub>s</sub>	Setup Time, HIGH or LOW D <sub>n</sub> to LE	5.0	-	3.0	3.5	ns	3–9		
t <sub>h</sub>	Hold Time, HIGH or LOW D <sub>n</sub> to LE	5.0	-	0	0	ns	3–9		
tw	LE Pulse Width, HIGH	5.0	-	3.5	4.0	ns	3–6		

\*Voltage Range 5.0 V is 5.0 V  $\pm$ 0.5 V.

#### CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C <sub>IN</sub>	Input Capacitance	5.0	pF	V <sub>CC</sub> = 5.0 V
C <sub>PD</sub>	Power Dissipation Capacitance	25	pF	$V_{CC} = 5.0 V$

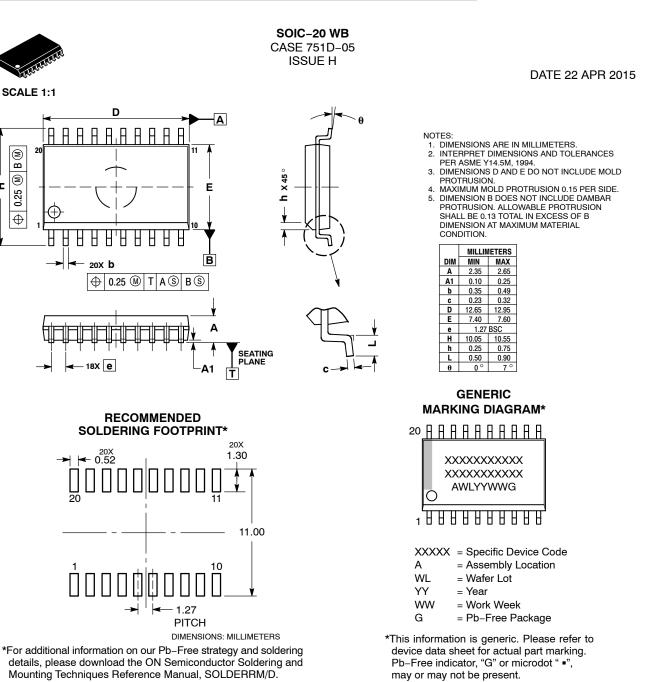
#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
MC74AC573DWG	SOIC-20 (Pb-Free)	38 Units / Rail
MC74AC573DWR2G	SOIC-20 (Pb-Free)	1000 Units / Tape & Reel
MC74AC573DTR2G	TSSOP-20 (Pb-Free)	2500 Units / Tape & Reel
MC74ACT573DWG	SOIC-20 (Pb-Free)	38 Units / Rail
MC74ACT573DWR2G	SOIC-20 (Pb-Free)	1000 Units / Tape & Reel
MC74ACT573DTR2G	TSSOP-20 (Pb-Free)	2500 Units / Tape & Reel

+For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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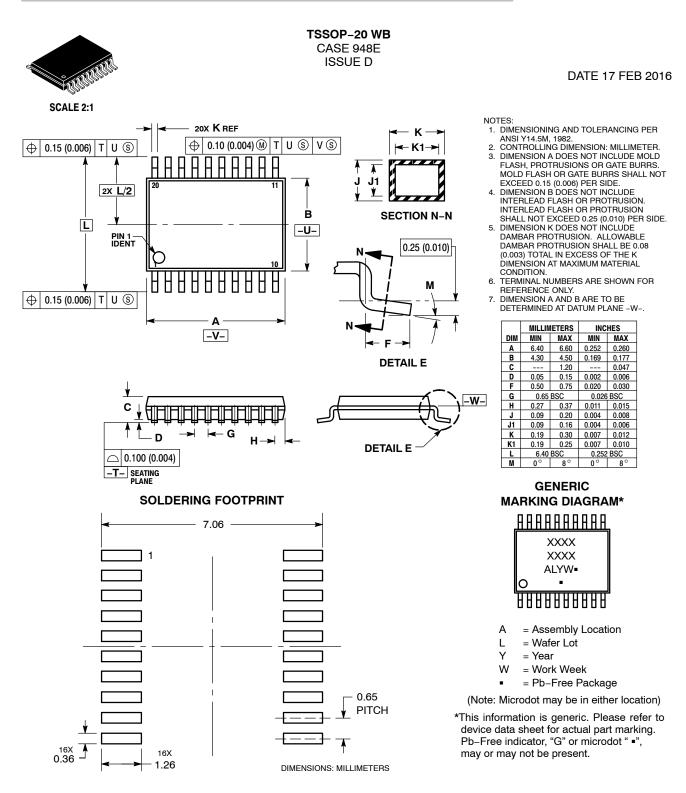
 

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