# Octal 3-State Noninverting Transparent Latch

# **High-Performance Silicon-Gate CMOS**

The MC74HC573A is identical in pinout to the LS573. The devices are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

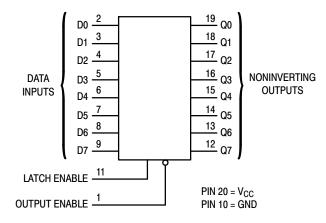
These latches appear transparent to data (i.e., the outputs change asynchronously) when Latch Enable is high. When Latch Enable goes low, data meeting the setup and hold time becomes latched.

The HC573A is identical in function to the HC373A but has the data inputs on the opposite side of the package from the outputs to facilitate PC board layout.

### **Features**

- Output Drive Capability: 15 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0 μA
- In Compliance with the JEDEC Standard No. 7.0 A Requirements
- Chip Complexity: 218 FETs or 54.5 Equivalent Gates
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

## **LOGIC DIAGRAM**



Design Criteria	Value	Units
Internal Gate Count*	54.5	ea.
Internal Gate Progation Delay	1.5	ns
Internal Gate Power Dissipation	5.0	μW
Speed Power Product	0.0075	рJ

<sup>\*</sup>Equivalent to a two-input NAND gate.



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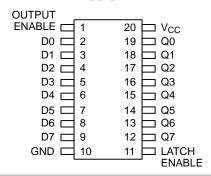
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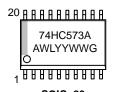


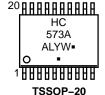
SOIC-20 DW SUFFIX CASE 751D TSSOP-20 DT SUFFIX CASE 948E

### **PIN ASSIGNMENT**



## MARKING DIAGRAMS





SOIC-20

A = Assembly Location

WL, L = Wafer Lot YY, Y = Year WW, W = Work Week

G or ■ = Pb–Free Package (Note: Microdot may be in either location)

### **FUNCTION TABLE**

	Output		
Output Latch Enable Enable		D	q
L	Н	Н	Н
L	Н	L	L
L	L	Х	No Change
I н	l x	l x	Z

X = Don't CareZ = High Impedance

## **ORDERING INFORMATION**

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

#### **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 $V_{CC}$ + 0.5	V
V <sub>out</sub>	DC Output Voltage (Referenced to GND)	$-0.5$ to $V_{CC} + 0.5$	V
l <sub>in</sub>	DC Input Current, per Pin	±20	mA
I <sub>out</sub>	DC Output Current, per Pin	±35	mA
Icc	DC Supply Current, V <sub>CC</sub> and GND Pins	±75	mA
P <sub>D</sub>	Power Dissipation in Still Air, SOIC Package† TSSOP Package†	500 450	mW
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
TL	Lead Temperature, 1 mm from Case for 10 Seconds (TSSOP or SOIC Package)	260	°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high–impedance circuit. For proper operation,  $V_{in}$  and  $V_{out}$  should be constrained to the range GND  $\leq$  ( $V_{in}$  or  $V_{out}$ )  $\leq$   $V_{CC}$ .

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or  $V_{CC}$ ). Unused outputs must be left open.

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.

†Derating: SOIC Package: -7 mW/°C from 65° to 125°C

TSSOP Package: -6.1 mW/°C from 65° to 125°C

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit	
V <sub>CC</sub>	DC Supply Voltage (Referenced to GND)		2.0	6.0	V
V <sub>in</sub> , V <sub>out</sub>	DC Input Voltage, Output Voltage (Referenced to GND)	0	V <sub>CC</sub>	V	
T <sub>A</sub>	Operating Temperature, All Package Types		<b>-</b> 55	+125	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time	$V_{CC} = 2.0 \text{ V}$	0	1000	ns
	(Figure 1)	$V_{CC} = 4.5 \text{ V}$	0	500	
		$V_{CC} = 6.0 \text{ V}$	0	400	

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.

## DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

				Guaranteed Limit		mit	
Symbol	Parameter	Test Conditions	V <sub>CC</sub> V	–55 to 25°C	≤85°C	≤125°C	Unit
V <sub>IH</sub>	Minimum High-Level Input Voltage	$V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V}$ $ I_{out}  \le 20  \mu\text{A}$	2.0 3.0 4.5 6.0	1.5 2.1 3.15 4.2	1.5 2.1 3.15 4.2	1.5 2.1 3.15 4.2	V
V <sub>IL</sub>	Maximum Low-Level Input Voltage	$V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V}$ $ I_{out}  \le 20  \mu\text{A}$	2.0 3.0 4.5 6.0	0.5 0.9 1.35 1.8	0.5 0.9 1.35 1 8	0.5 0.9 1.35 1.8	V
V <sub>OH</sub>	Minimum High-Level Output Voltage	$V_{in} = V_{IH} \text{ or } V_{IL}$ $ I_{out}  \le 20 \mu A$	2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	V
		$\begin{array}{ c c c }\hline V_{in} = V_{IH} \text{ or } V_{IL} &  I_{out}  \leq 2.4 \text{mA} \\  I_{out}  \leq 6.0 \text{ mA} \\  I_{out}  \leq 7.8 \text{ mA} \end{array}$	3.0 4.5 6.0	2.48 3.98 5.48	2.34 3.84 5.34	2.2 3.7 5.2	
V <sub>OL</sub>	Maximum Low–Level Output Voltage	$V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V}$ $ I_{out}  \le 20  \mu\text{A}$	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	\ \
		$ \begin{aligned} V_{in} = V_{IH} \text{ or } V_{IL} &   I_{out}  \leq 2.4 \text{mA} \\  I_{out}  \leq 6.0 \text{ mA} \\  I_{out}  \leq 7.8 \text{ mA} \end{aligned} $	3.0 4.5 6.0	0.26 0.26 0.26	0.33 0.33 0.33	0.4 0.4 0.4	
l <sub>in</sub>	Maximum Input Leakage Current	$V_{in} = V_{CC}$ or GND	6.0	±0.1	±1.0	±1.0	μΑ
l <sub>OZ</sub>	Maximum Three–State Leakage Current		6.0	±0.5	±5.0	±10	μΑ
I <sub>CC</sub>	Maximum Quiescent Supply Current (per Package)	$V_{in} = V_{CC}$ or GND $II_{out}I = 0 \mu A$	6.0	4.0	40	160	μΑ

## AC ELECTRICAL CHARACTERISTICS ( $C_L = 50 \text{ pF}$ , Input $t_r = t_f = 6.0 \text{ ns}$ )

		V <sub>CC</sub>	Guaranteed Limit		it	
Symbol	Parameter	v	–55 to 25°C	≤85°C	≤125°C	Unit
t <sub>PLH</sub> ,	Maximum Propagation Delay, Input D to Q	2.0	150	190	225	ns
$t_{PHL}$	(Figures 1 and 5)	3.0	100	140	180	
		4.5	30	38	45	
		6.0	26	33	38	
t <sub>PLH</sub> ,	Maximum Propagation Delay, Latch Enable to Q	2.0	160	200	240	ns
t <sub>PHL</sub>	(Figures 2 and 5)	3.0	105	145	190	
		4.5	32	40	48	
		6.0	27	34	41	
$t_{PLZ}$ ,	Maximum Propagation Delay, Output Enable to Q	2.0	150	190	225	ns
$t_{PHZ}$	(Figures 3 and 6)	3.0	100	125	150	
		4.5	30	38	45	
		6.0	26	33	38	
$t_{PZL},$	Maximum Propagation Delay, Output Enable to Q	2.0	150	190	225	ns
t <sub>PZH</sub>	(Figures 3 and 6)	3.0	100	125	150	
		4.5	30	38	45	
		6.0	26	33	38	
t <sub>TLH</sub> ,	Maximum Output Transition Time, Any Output	2.0	60	75	90	ns
$t_{THL}$	(Figures 1 and 5)	3.0	27	32	36	
		4.5	12	15	18	
		6.0	10	13	15	
C <sub>in</sub>	Maximum Input Capacitance		10	10	10	pF
C <sub>out</sub>	Maximum 3-State Output Capacitance (Output in High-Impedance	State)	15	15	15	pF
	-		Typical @ 25°C, V <sub>CC</sub> = 5.0 V		= 5.0 V	

C<sub>PD</sub> Power Dissipation Capacitance (Per Enabled Output)\*

\*Used to determine the no–load dynamic power consumption: P<sub>D</sub> = C<sub>PD</sub> V<sub>CC</sub><sup>2</sup>f + I<sub>CC</sub> V<sub>CC</sub>.

## **TIMING REQUIREMENTS** ( $C_L = 50 \text{ pF}$ , Input $t_r = t_f = 6.0 \text{ ns}$ )

				Guaranteed Limit						
		V <sub>CC</sub>		-55 to 25°C ≤		5°C	≤12	25°C		
Symbol	Parameter	Figure	V	Min	Max	Min	Max	Min	Max	Unit
t <sub>su</sub>	Minimum Setup Time, Input D to Latch Enable	4	2.0 3.0	50 40		65 50		75 60		ns
			4.5 6.0	10 9.0		13 11		15 13		
t <sub>h</sub>	Minimum Hold Time, Latch Enable to Input D	4	2.0 3.0 4.5 6.0	5.0 5.0 5.0 5.0		5.0 5.0 5.0 5.0		5.0 5.0 5.0 5.0		ns
t <sub>w</sub>	Minimum Pulse Width, Latch Enable	2	2.0 3.0 4.5 6.0	75 60 15 13		95 80 19 16		110 90 22 19		ns
t <sub>r</sub> , t <sub>f</sub>	Maximum Input Rise and Fall Times	1	2.0 3.0 4.5 6.0		1000 800 500 400		1000 800 500 400		1000 800 500 400	ns

## **SWITCHING WAVEFORMS**

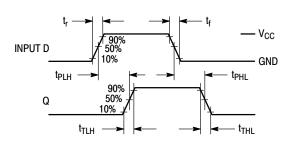


Figure 1.

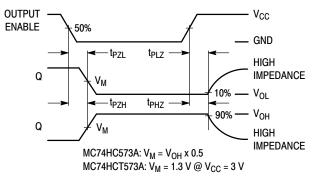
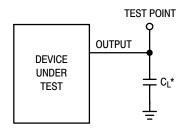
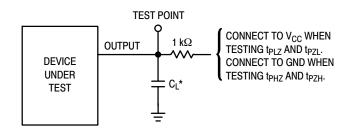


Figure 3.



\*Includes all probe and jig capacitance

Figure 5. Test Circuit



\*Includes all probe and jig capacitance

Figure 6. Test Circuit

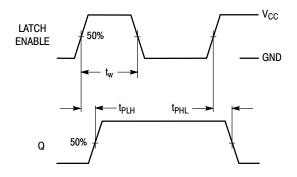


Figure 2.

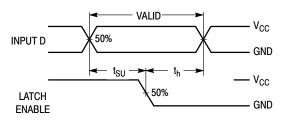


Figure 4.

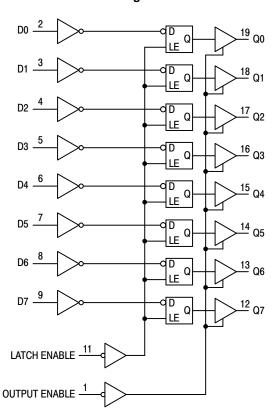


Figure 7. EXPANDED LOGIC DIAGRAM

## **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
MC74HC573ADWG	SOIC-20 WIDE (Pb-Free)	38 Units / Rail
MC74HC573ADWR2G	SOIC-20 WIDE (Pb-Free)	1000 Tape & Reel
MC74HC573ADTG	TSSOP-20 75 Units / Rail (Pb-Free)	
MC74HC573ADTR2G	TR2G TSSOP-20 (Pb-Free) 2500 Tape	
NLV74HC573ADTR2G*	TSSOP-20 (Pb-Free)	2500 Tape & Reel

<sup>†</sup>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.
\*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC–Q100 Qualified and PPAP

Capable.

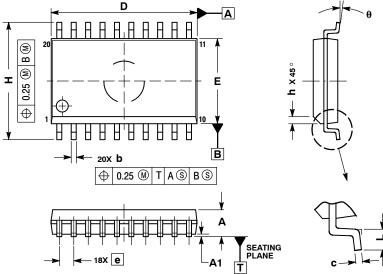




SOIC-20 WB CASE 751D-05 **ISSUE H** 

**DATE 22 APR 2015** 

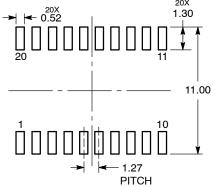
# SCALE 1:1



- DIMENSIONS ARE IN MILLIMETERS.
   INTERPRET DIMENSIONS AND TOLERANCES.
- PER ASME Y14.5M, 1994.
  3. DIMENSIONS D AND E DO NOT INCLUDE MOLD
- PROTRUSION.
  MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
- DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL

	MILLIMETERS				
DIM	MIN	MAX			
Α	2.35	2.65			
A1	0.10	0.25			
b	0.35	0.49			
С	0.23	0.32			
D	12.65	12.95			
E	7.40	7.60			
е	1.27	BSC			
Н	10.05	10.55			
h	0.25	0.75			
L	0.50	0.90			
A	0 °	7 °			

## **RECOMMENDED SOLDERING FOOTPRINT\***



DIMENSIONS: MILLIMETERS

## **GENERIC MARKING DIAGRAM\***



XXXXX = Specific Device Code = Assembly Location

WL = Wafer Lot ΥY = Year WW = Work Week = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

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<sup>\*</sup>For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



## TSSOP-20 WB CASE 948E ISSUE D

**DATE 17 FEB 2016** 





#### NOTES:

- DIMENSIONING AND TOLERANCING PER
- ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
- 3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
- FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K
- (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
- TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

  7. DIMENSION A AND B ARE TO BE
- DETERMINED AT DATUM PLANE -W-

	MILLIMETERS		INC	HES	
DIM	MIN	MAX	MIN	MAX	
Α	6.40	6.60	0.252	0.260	
В	4.30	4.50	0.169	0.177	
С		1.20		0.047	
D	0.05	0.15	0.002	0.006	
F	0.50	0.75	0.020	0.030	
G	0.65	BSC	0.026 BSC		
Н	0.27	0.37	0.011	0.015	
J	0.09	0.20	0.004	0.008	
J1	0.09	0.16	0.004	0.006	
K	0.19	0.30	0.007	0.012	
K1	0.19	0.25	0.007	0.010	
L	6.40 BSC		0.252 BSC		
M	0°	8°	0°	8°	

## **SOLDERING FOOTPRINT**



## **GENERIC MARKING DIAGRAM\***



= Assembly Location

= Wafer Lot

= Year

= Work Week

= Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " ■", may or may not be present.

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