

# MC74HC573A

## Octal 3-State Noninverting Transparent Latch

### High-Performance Silicon-Gate CMOS

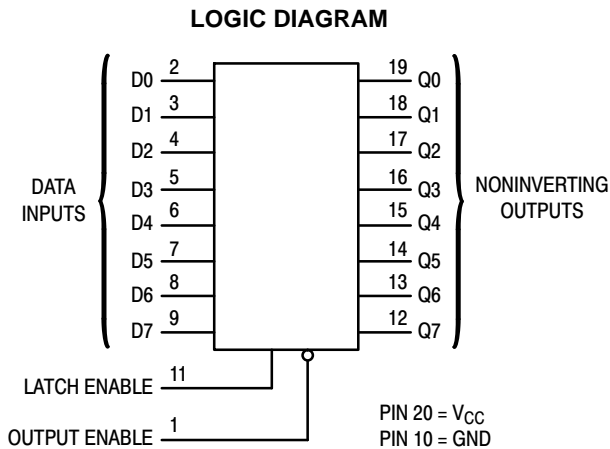
The MC74HC573A is identical in pinout to the LS573. The devices are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

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  $\mu$ A
- 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



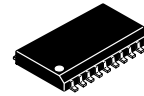
Design Criteria	Value	Units
Internal Gate Count*	54.5	ea.
Internal Gate Propagation Delay	1.5	ns
Internal Gate Power Dissipation	5.0	$\mu$ W
Speed Power Product	0.0075	pJ

\*Equivalent to a two-input NAND gate.



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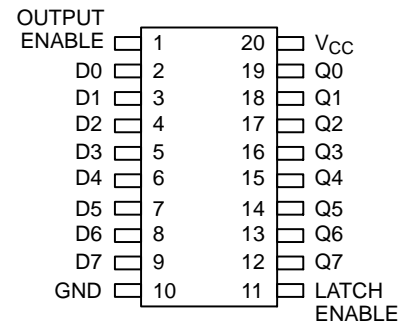


**SOIC-20**  
**DW SUFFIX**  
**CASE 751D**

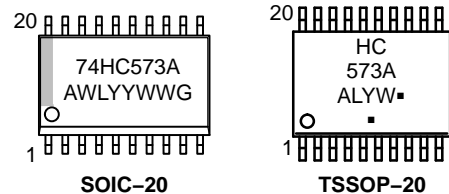


**TSSOP-20**  
**DT SUFFIX**  
**CASE 948E**

#### PIN ASSIGNMENT



#### MARKING DIAGRAMS



**SOIC-20**                      **TSSOP-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

Inputs		Output	
Output Enable	Latch Enable	D	Q
L	H	H	H
L	H	L	L
L	L	X	No Change
H	X	X	Z

X = Don't Care  
 Z = High Impedance

#### ORDERING INFORMATION

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

# MC74HC573A

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
$V_{in}$	DC Input Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$V_{out}$	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
$I_{in}$	DC Input Current, per Pin	$\pm 20$	mA
$I_{out}$	DC Output Current, per Pin	$\pm 35$	mA
$I_{CC}$	DC Supply Current, $V_{CC}$ and GND Pins	$\pm 75$	mA
$P_D$	Power Dissipation in Still Air, SOIC Package† TSSOP Package†	500 450	mW
$T_{stg}$	Storage Temperature	-65 to +150	°C
$T_L$	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  $GND \leq (V_{in} \text{ or } V_{out}) \leq V_{CC}$ . 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
$V_{CC}$	DC Supply Voltage (Referenced to GND)	2.0	6.0	V
$V_{in}, V_{out}$	DC Input Voltage, Output Voltage (Referenced to GND)	0	$V_{CC}$	V
$T_A$	Operating Temperature, All Package Types	-55	+125	°C
$t_r, t_f$	Input Rise and Fall Time (Figure 1)	$V_{CC} = 2.0 \text{ V}$ $V_{CC} = 4.5 \text{ V}$ $V_{CC} = 6.0 \text{ V}$	0 1000 500 400	ns

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)

Symbol	Parameter	Test Conditions	$V_{CC}$ V	Guaranteed Limit			Unit
				-55 to 25°C	$\leq 85^\circ\text{C}$	$\leq 125^\circ\text{C}$	
$V_{IH}$	Minimum High-Level Input Voltage	$V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V}$ $ I_{out}  \leq 20 \mu\text{A}$	2.0	1.5	1.5	1.5	V
			3.0	2.1	2.1	2.1	
			4.5	3.15	3.15	3.15	
			6.0	4.2	4.2	4.2	
$V_{IL}$	Maximum Low-Level Input Voltage	$V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V}$ $ I_{out}  \leq 20 \mu\text{A}$	2.0	0.5	0.5	0.5	V
			3.0	0.9	0.9	0.9	
			4.5	1.35	1.35	1.35	
			6.0	1.8	1.8	1.8	
$V_{OH}$	Minimum High-Level Output Voltage	$V_{in} = V_{IH} \text{ or } V_{IL}$ $ I_{out}  \leq 20 \mu\text{A}$	2.0	1.9	1.9	1.9	V
			4.5	4.4	4.4	4.4	
			6.0	5.9	5.9	5.9	
			$V_{in} = V_{IH} \text{ or } V_{IL}$ $ I_{out}  \leq 2.4 \text{ mA}$ $ I_{out}  \leq 6.0 \text{ mA}$ $ I_{out}  \leq 7.8 \text{ mA}$	3.0	2.48	2.34	
$V_{OL}$	Maximum Low-Level Output Voltage	$V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V}$ $ I_{out}  \leq 20 \mu\text{A}$	2.0	0.1	0.1	0.1	V
			4.5	0.1	0.1	0.1	
			6.0	0.1	0.1	0.1	
			$V_{in} = V_{IH} \text{ or } V_{IL}$ $ I_{out}  \leq 2.4 \text{ mA}$ $ I_{out}  \leq 6.0 \text{ mA}$ $ I_{out}  \leq 7.8 \text{ mA}$	3.0	0.26	0.33	
$I_{in}$	Maximum Input Leakage Current	$V_{in} = V_{CC} \text{ or } GND$	6.0	$\pm 0.1$	$\pm 1.0$	$\pm 1.0$	$\mu\text{A}$
$I_{OZ}$	Maximum Three-State Leakage Current	Output in High-Impedance State $V_{in} = V_{IL} \text{ or } V_{IH}$ $V_{out} = V_{CC} \text{ or } GND$	6.0	$\pm 0.5$	$\pm 5.0$	$\pm 10$	$\mu\text{A}$
$I_{CC}$	Maximum Quiescent Supply Current (per Package)	$V_{in} = V_{CC} \text{ or } GND$ $ I_{out}  = 0 \mu\text{A}$	6.0	4.0	40	160	$\mu\text{A}$

# MC74HC573A

## AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6.0 ns)

Symbol	Parameter	V <sub>CC</sub> V	Guaranteed Limit			Unit
			-55 to 25°C	≤ 85°C	≤ 125°C	
t <sub>PLH</sub> , t <sub>PHL</sub>	Maximum Propagation Delay, Input D to Q (Figures 1 and 5)	2.0	150	190	225	ns
		3.0	100	140	180	
		4.5	30	38	45	
		6.0	26	33	38	
t <sub>PLH</sub> , t <sub>PHL</sub>	Maximum Propagation Delay, Latch Enable to Q (Figures 2 and 5)	2.0	160	200	240	ns
		3.0	105	145	190	
		4.5	32	40	48	
		6.0	27	34	41	
t <sub>PLZ</sub> , t <sub>PHZ</sub>	Maximum Propagation Delay, Output Enable to Q (Figures 3 and 6)	2.0	150	190	225	ns
		3.0	100	125	150	
		4.5	30	38	45	
		6.0	26	33	38	
t <sub>PZL</sub> , t <sub>PZH</sub>	Maximum Propagation Delay, Output Enable to Q (Figures 3 and 6)	2.0	150	190	225	ns
		3.0	100	125	150	
		4.5	30	38	45	
		6.0	26	33	38	
t <sub>TLH</sub> , t <sub>THL</sub>	Maximum Output Transition Time, Any Output (Figures 1 and 5)	2.0	60	75	90	ns
		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
C <sub>PD</sub>	Power Dissipation Capacitance (Per Enabled Output)*	Typical @ 25°C, V <sub>CC</sub> = 5.0 V			pF	
		23				

\* 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<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6.0 ns)

Symbol	Parameter	Figure	V <sub>CC</sub> V	Guaranteed Limit						Unit
				-55 to 25°C		≤ 85°C		≤ 125°C		
				Min	Max	Min	Max	Min	Max	
t <sub>su</sub>	Minimum Setup Time, Input D to Latch Enable	4	2.0	50		65		75		ns
			3.0	40		50		60		
			4.5	10		13		15		
			6.0	9.0		11		13		
t <sub>h</sub>	Minimum Hold Time, Latch Enable to Input D	4	2.0	5.0		5.0		5.0		ns
			3.0	5.0		5.0		5.0		
			4.5	5.0		5.0		5.0		
			6.0	5.0		5.0		5.0		
t <sub>w</sub>	Minimum Pulse Width, Latch Enable	2	2.0	75		95		110		ns
			3.0	60		80		90		
			4.5	15		19		22		
			6.0	13		16		19		
t <sub>r</sub> , t <sub>f</sub>	Maximum Input Rise and Fall Times	1	2.0		1000		1000		1000	ns
			3.0		800		800		800	
			4.5		500		500		500	
			6.0		400		400		400	

# MC74HC573A

## SWITCHING WAVEFORMS

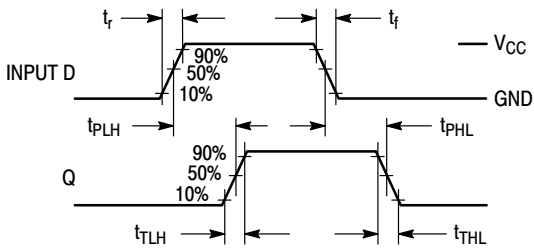


Figure 1.

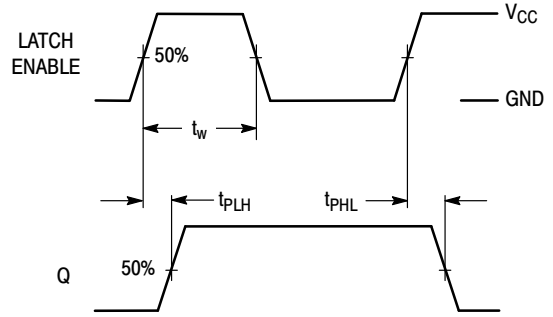


Figure 2.

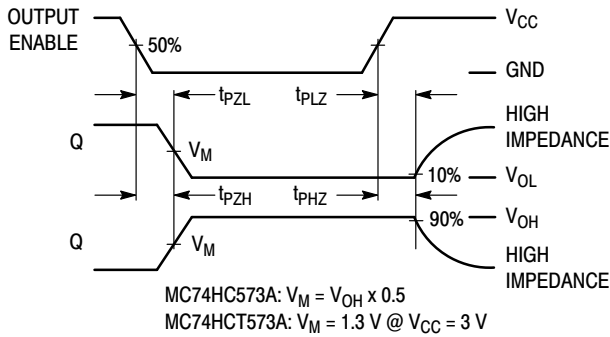


Figure 3.

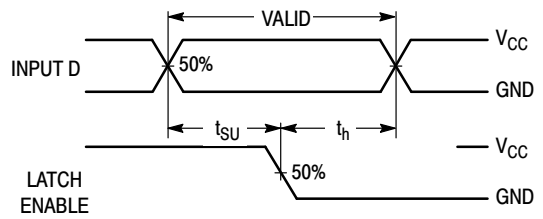
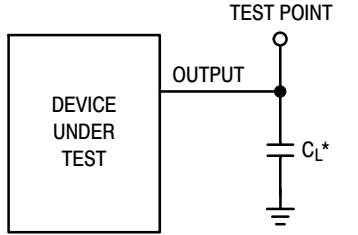
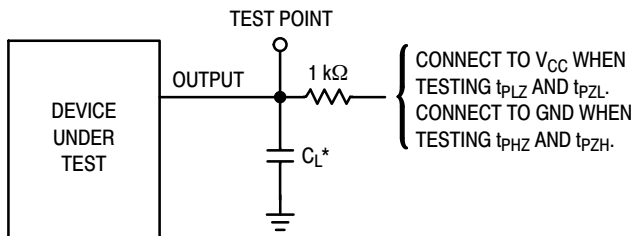


Figure 4.



\*Includes all probe and jig capacitance

Figure 5. Test Circuit



\*Includes all probe and jig capacitance

Figure 6. Test Circuit

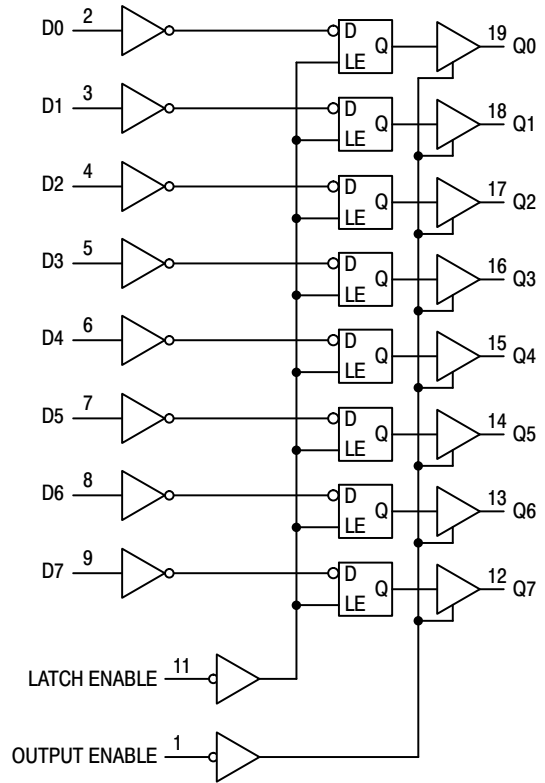


Figure 7. EXPANDED LOGIC DIAGRAM

# MC74HC573A

## ORDERING INFORMATION

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

\*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



SCALE 1:1

SOIC-20 WB  
CASE 751D-05  
ISSUE H

DATE 22 APR 2015



NOTES:

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

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

### GENERIC MARKING DIAGRAM\*



- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- YY = Year
- WW = Work Week
- G = Pb-Free Package

### RECOMMENDED SOLDERING FOOTPRINT\*



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

\*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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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



TSSOP-20 WB  
CASE 948E  
ISSUE D

DATE 17 FEB 2016

SCALE 2:1



NOTES:

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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.40	6.60	0.252	0.260
B	4.30	4.50	0.169	0.177
C	---	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	
H	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°

**GENERIC MARKING DIAGRAM\***



- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = 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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