CD54HCT573, CD74HCT573 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPU

SCLS455C - FEBRUARY 2001 - REVISED MAY 2004

- 4.5-V to 5.5-V V_{CC} Operation
- Wide Operating Temperature Range of -55°C to 125°C
- **Balanced Propagation Delays and Transition Times**
- Standard Outputs Drive Up To 10 LS-TTL
- Significant Power Reduction Compared to **LS-TTL Logic ICs**
- Inputs Are TTL-Voltage Compatible

description/ordering information

The 'HCT573 devices are octal transparent D-type latches. When the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is low, the Q outputs are latched at the logic levels of the D inputs.

CD54HCT573 . . . F PACKAGE CD74HCT573 . . . DB. E. OR M PACKAGE (TOP VIEW) 20 🛮 V_{CC} <u>OE</u> [1D **∏** 2 19**∏** 1Q 2D 🛮 3 18 2Q зр П 17 3Q 4D **∏** 5 16 7 4Q 15 7 5Q

> 7D 13 7Q 8D **[**] 9 12 8Q 11 ΠLE GND

14**∏** 6Q

5D ∏ 6

6D Π

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without interface or pullup components.

OE does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

ORDERING INFORMATION

TA	PAC	KAGET	ORDERABLE PART NUMBER	TOP-SIDE MARKING		
	PDIP – E	Tube	CD74HCT573E	CD74HCT573E		
	SSOP - DB	Tape and reel	CD74HCT573DBR	HK573		
-55°C to 125°C	0010 14	Tube	CD74HCT573M			
	SOIC - M	Tape and reel	CD74HCT573M96	HCT573M		
	CDIP – F	Tube	CD54HCT573F3A	CD54HCT573F3A		

[†]Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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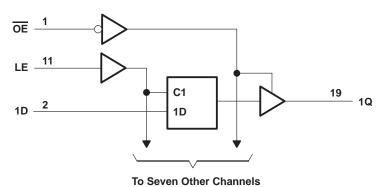


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FUNCTION TABLE (each latch)

	INPUTS	OUTPUT	
OE	LE	D	Q
L	Н	Н	Н
L	Н	L	L
L	L	Χ	Q_0
Н	Χ	Χ	Z

logic diagram (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V _{CC}		–0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see	e Note 1)	±20 mA
Output clamp current, IOK (VO < 0 or VO > VCC)) (see Note 1)	±20 mA
Continuous output drain current per output, IO (\	$V_{O} = 0$ to V_{CC})	±35 mA
Continuous output source or sink current per out	tput, $I_O(V_O = 0 \text{ to } V_{CC})$	±25 mA
Continuous current through V _{CC} or GND		±50 mA
Package thermal impedance, θ_{JA} (see Note 2):	DB package	70°C/W
	E package	69°C/W
	M package	58°C/W
Storage temperature range, T _{stg}		

[†] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

2. The package thermal impedance is calculated in accordance with JESD 51-7.



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recommended operating conditions (see Note 3)

		T _A = 2	25°C	T _A = −55°C TO 125°C		T _A = -40°C TO 85°C		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
VCC	Supply voltage	4.5	5.5	4.5	5.5	4.5	5.5	V
VIH	High-level input voltage	2		2		2		V
\vee_{IL}	Low-level input voltage		8.0		0.8		0.8	V
٧ _I	Input voltage		VCC		VCC		VCC	V
VO	Output voltage		VCC		VCC		VCC	V
Δt/Δν	Input transition rise or fall rate		500		500		500	ns

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST	VCC	T _A = 25°C		T _A = -		T _A = -40°C TO 85°C		UNIT		
				MIN	MAX	MIN	MAX	MIN	MAX		
V	\/ \/ an\/	I _{OH} = -20 μA	4.5.\/	4.4		4.4		4.4			
VOH	$V_I = V_{IH}$ or V_{IL}	$I_{OH} = -6 \text{ mA}$	4.5 V	3.98		3.7		3.84		V	
V	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	$I_{OL} = 20 \mu A$	4.5.1/		0.1		0.1		0.1	V	
VOL	VI = VIH or VIL	$I_{OL} = 6 \text{ mA}$	4.5 V		0.26		0.4		0.33	V	
lj	$V_I = V_{CC}$ or 0		5.5 V		±0.1		±1		±1	μΑ	
loz	$V_O = V_{CC}$ or 0		5.5 V		±0.5		±10		±5	μΑ	
Icc	$V_I = V_{CC}$ or 0,	IO = 0	5.5 V		8		160		80	μΑ	
∆l _{CC} †	One input at V _{CC} – 2	4.5 V to 5.5 V		360		490		450	μΑ		
C _i					10		10		10	pF	
Co					20		20	_	20	рF	

 $^{^{\}dagger}$ Additional quiescent supply current per input pin, TTL inputs high, 1 unit load. For dual-supply systems, theoretical worst-case (V_I = 2.4 V, V_{CC} = 5.5 V) specification is 1.8 mA.

HCT INPUT LOADING TABLE

INPUT	UNIT LOAD
ŌĒ	1.25
Any D	0.3
LE	0.65

Unit load is ΔI_{CC} limit specified in electrical characteristics table (e.g., 360 μA max at 25°C).

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timing requirements over recommended operating free-air temperature range, V_{CC} = 4.5 V (unless otherwise noted) (see Figure 1)

		T _A = 1	25°C	T _A = -	-55°C 25°C	T _A = -		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t _W	Pulse duration, LE high	16		24		20		ns
t _{su}	Setup time, data before LE↓	13		20		16		ns
th	Hold time, data after LE↓	10		15		13		ns

switching characteristics over recommended operating free-air temperature range, V_{CC} = 4.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	TO	LOAD	T _A = 25°C		T _A = -	.55°C 25°C	T _A = -40°C TO 85°C		UNIT	
	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	MAX	MIN	MAX	MIN	MAX		
,	D		0 50 5		35		53		44		
^t pd	LE	Q	C _L = 50 pF		35	53			44	ns	
t _{en}	ŌE	Q	C _L = 50 pF		35		53		44	ns	
^t dis	ŌE	Q	C _L = 50 pF		35		53		44	ns	
t _t		Q	C _L = 50 pF		12		18		15	ns	

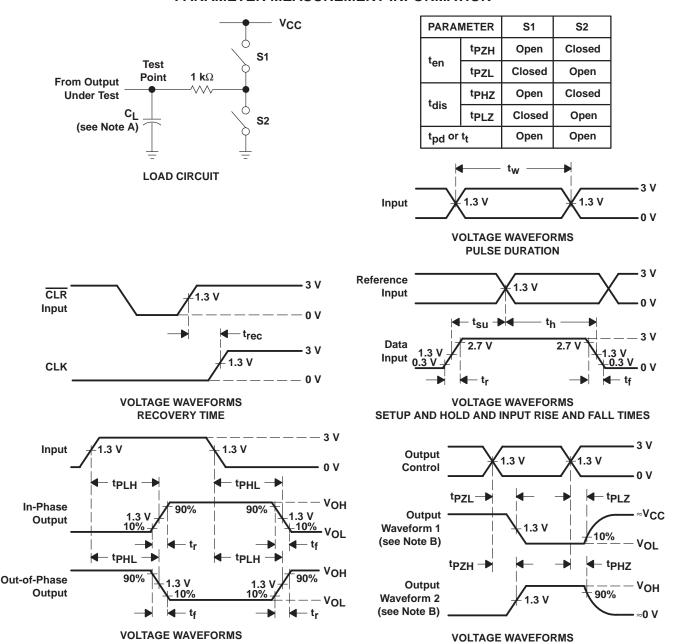
operating characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$

	PARAMETER	TYP	UNIT
Cpc	Power dissipation capacitance	53	pF

OUTPUT ENABLE AND DISABLE TIMES

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PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_I includes probe and test-fixture capacitance.

PROPAGATION DELAY AND OUTPUT TRANSITION TIMES

- B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, $Z_O = 50 \Omega$, $t_f = 6 \text{ ns}$, $t_f = 6 \text{ ns}$.
- D. For clock inputs, f_{max} is measured with the input duty cycle at 50%.
- E. The outputs are measured one at a time, with one input transition per measurement.
- F. tpLZ and tpHZ are the same as tdis.
- G. tpzL and tpzH are the same as ten.
- H. tplH and tpHL are the same as tpd.

Figure 1. Load Circuit and Voltage Waveforms







10-Jun-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	_	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
5962-8685601RA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8685601RA CD54HCT573F3A	Samples
CD54HCT573F	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD54HCT573F	Samples
CD54HCT573F3A	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8685601RA CD54HCT573F3A	Samples
CD74HCT573DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HK573	Samples
CD74HCT573E	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT573E	Samples
CD74HCT573EE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT573E	Samples
CD74HCT573M	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT573M	Samples
CD74HCT573M96	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT573M	Samples
CD74HCT573M96G4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT573M	Samples

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes. **Pb-Free** (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

⁽³⁾ MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.





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- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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OTHER QUALIFIED VERSIONS OF CD54HCT573, CD74HCT573:

Catalog: CD74HCT573

Military: CD54HCT573

NOTE: Qualified Version Definitions:

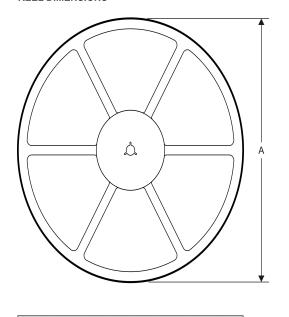
- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications

PACKAGE MATERIALS INFORMATION

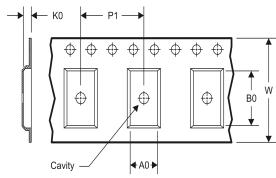
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TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

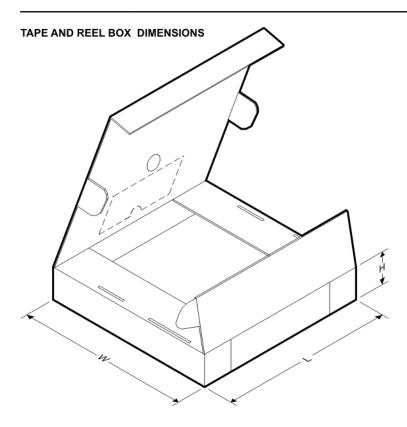
TAPE AND REEL INFORMATION

*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CD74HCT573DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
CD74HCT573M96	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HCT573DBR	SSOP	DB	20	2000	367.0	367.0	38.0
CD74HCT573M96	SOIC	DW	20	2000	367.0	367.0	45.0

14 LEADS SHOWN



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.





SOIC



NOTES:

- 1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
- 5. Reference JEDEC registration MS-013.



SOIC



NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOIC



NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



DB (R-PDSO-G**)

PLASTIC SMALL-OUTLINE

28 PINS SHOWN



NOTES: A. All linear dimensions are in millimeters.

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.

D. Falls within JEDEC MO-150

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