SN54HCT573, SN74HCT573 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS176E - MARCH 1984 - REVISED JULY 2003

- Operating Voltage Range of 4.5 V to 5.5 V
- High-Current 3-State Outputs Drive Bus Lines Directly or Up To 15 LSTTL Loads
- Low Power Consumption, 80-μA Max I_{CC}
- Typical t_{pd} = 21 ns
- ±6-mA Output Drive at 5 V
- Low Input Current of 1 μA Max
- Inputs Are TTL-Voltage Compatible
- Bus-Structured Pinout

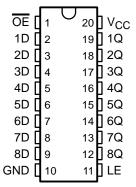
description/ordering information

These octal transparent D-type latches feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. The 'HCT573 devices are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

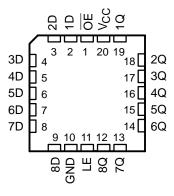
While the latch-enable (LE) input is high, the Q outputs respond to the data (D) inputs. When LE is low, the outputs are latched to retain the data that was set up at the D inputs.

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance

SN54HCT573 . . . J OR W PACKAGE SN74HCT573 . . . DB, DW, N, NS, OR PW PACKAGE (TOP VIEW)



SN54HCT573 . . . FK PACKAGE (TOP VIEW)



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.

ORDERING INFORMATION

TA	PACKAGET		ORDERABLE PART NUMBER	TOP-SIDE MARKING	
	PDIP – N	Tube	SN74HCT573N	SN74HCT573N	
–40°C to 85°C	SOIC - DW	Tube	SN74HCT573DW	HCT573	
	SOIC - DVV	Tape and reel	SN74HCT573DWR	HC1573	
	SOP - NS	Tape and reel	SN74HCT573NSR	HCT573	
	SSOP – DB	Tape and reel	SN74HCT573DBR	HT573	
	TSSOP – PW	Tube	SN74HCT573PW	HT573	
	1330P - PW	Tape and reel	SN74HCT573PWR	піз/з	
	CDIP – J	Tube	SNJ54HCT573J	SNJ54HCT573J	
–55°C to 125°C	CFP – W	Tube	SNJ54HCT573W	SNJ54HCT573W	
	LCCC – FK	Tube	SNJ54HCT573FK	SNJ54HCT573FK	

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



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



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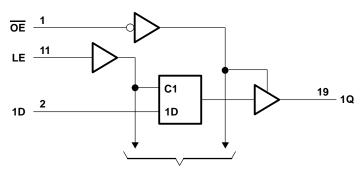
description/ordering information (continued)

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.

FUNCTION TABLE (each latch)

	INPUTS	OUTPUT	
OE	LE	D	Q
L	Н	Н	Н
L	Н	L	L
L	L	Χ	Q ₀
Н	X	Χ	Z

logic diagram (positive logic)



To Seven Other Channels

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

Supply voltage range, V _{CC} –0.5 \	√ to 7 V
Input clamp current, I_{IK} (V_I < 0 or V_I > V_{CC}) (see Note 1)	±20 mA
Output clamp current, I _{OK} (V _O < 0 or V _O > V _{CC}) (see Note 1)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	
Continuous current through V _{CC} or GND	
Package thermal impedance, θ_{JA} (see Note 2): DB package	
DW package	58°C/W
N package	69°C/W
NS package	60°C/W
PW package	83°C/W
Storage temperature range, T _{sto} 65°C to	150°C

[†] 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)

			SN	54HCT5	73	SN	74HCT5	73	UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	UNIT
VCC	Supply voltage		4.5	5	5.5	4.5	5	5.5	V
VIH	High-level input voltage	V _{CC} = 4.5 V to 5.5 V	2	S		2			V
V _{IL}	Low-level input voltage	V _{CC} = 4.5 V to 5.5 V		Q'	0.8			0.8	V
VI	Input voltage		0	Ć	VCC	0		VCC	V
Vo	Output voltage		0 <	20	Vcc	0		Vcc	٧
Δt/Δν	Input transition rise/fall time		200)	500			500	ns
T _A	Operating free-air temperature		-55		125	-40		85	°C

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 CONDITIONS		vcc	Т	A = 25°C	;	SN54H0	CT573	SN74HCT573		UNIT
PARAMETER			VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
Vou	Maria Marian Marian Maria		4.5 V	4.4	4.499		4.4		4.4		V
VOH	VI = VIH or VIL	$I_{OH} = -6 \text{ mA}$	4.5 V	3.98	4.3		3.7	7	3.84]
Vai	\/ı	Ι _Ο L = 20 μΑ	4.5 V		0.001	0.1		0.1		0.1	V
VOL	VI = VIH or VIL	I _{OL} = 6 mA	4.5 V		0.17	0.26		0.4		0.33	l v l
lį	$V_I = V_{CC}$ or 0		5.5 V		±0.1	±100	7	±1000		±1000	nA
loz	VO = VCC or 0		5.5 V		±0.01	±0.5	2	±10		±5	μΑ
Icc	$V_I = V_{CC}$ or 0,	I _O = 0	5.5 V			8	70,	160		80	μΑ
∆l _{CC} †	One input at 0.5 V or 2.4 V, Other inputs at 0 or V _{CC}		5.5 V		1.4	2.4	Q	3		2.9	mA
C _i			4.5 V to 5.5 V		3	10		10		10	pF

[†] This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

timing requirements over recommended operating free-air temperature range (unless otherwise noted)

		,,		T _A = 25°C		SN54HCT573		SN74HCT573		
		VCC	MIN	MAX	MIN	MAX	MIN	MAX	UNIT	
T.	Pulse duration, LE high	4.5 V	20		30	7/6	25		ns	
t _W	Fuise duration, LE mgm	5.5 V	17		27	PRE	23		115	
	Sotup time, data hafara I E	4.5 V	10		15	' <i>F</i>	13		ns	
t _{su}	Setup time, data before LE↓	5.5 V	9		14		12			
.	Hold time, data after LE↓	4.5 V	5		5		5			
t _h	Hold time, data after LE↓		5		5		5		ns	

SN54HCT573, SN74HCT573 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

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switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	Vaa	TA	∖ = 25°C	;	SN54HCT573	SN74HCT573	UNIT
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN MAX	MIN MAX	UNIT
	D	Q	4.5 V		25	35	53	44	
.	D	y	5.5 V		21	32	48	40	20
^t pd	LE	Δην. Ο	4.5 V		28	35	53	44	ns
	LE	Any Q	5.5 V		25	32	48	40	
4	ŌĒ	Any O	4.5 V		26	35	53	44	no
^t en	OE	Any Q	5.5 V		23	32	3 48	40	ns
+	ŌĒ	Any Q	4.5 V		23	35	53	44	ns
^t dis	OE	Ally Q	5.5 V		22	32	48	40	115
4.		Δην. Ο	4.5 V		9	12	18	15	no
t _t		Any Q	5.5 V		9	11	16	14	ns

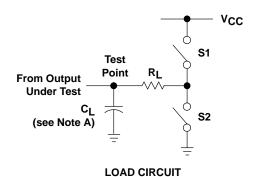
switching characteristics over recommended operating free-air temperature range, C_L = 150 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	Vac	T/	գ = 25°C	;	SN54HCT573	SN74HCT573	UNIT	
PARAMETER	(INPUT)		VCC	MIN	TYP	MAX	MIN MAX	MIN MAX	UNIT	
	D	Q	4.5 V		32	52	79	65		
.	D	α	5.5 V		27	47	71	59	20	
^t pd	LE	Any O	4.5 V		38	52	79	65	ns	
	LE	Any Q	5.5 V		36	47	71	59		
+	ŌĒ	Any O	4.5 V		33	52	79	65	no	
^t en	OE	Any Q	5.5 V		28	47	9 71	59	ns	
4.			4.5 V		18	42	63	53		
t _t		Any Q	5.5 V		16	38	57	48	ns	

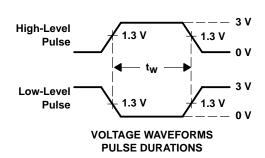
operating characteristics, T_A = 25°C

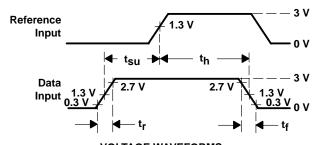
	PARAMETER	TEST CONDITIONS	TYP	UNIT
C _{pd}	Power dissipation capacitance per latch	No load	50	pF

PARAMETER MEASUREMENT INFORMATION

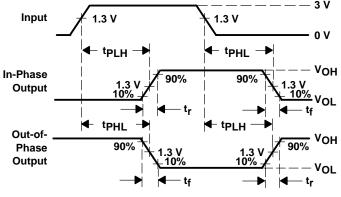


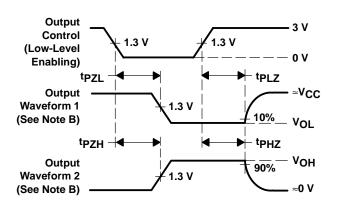
PARA	VIETER	RL	CL	S1	S2	
	tPZH	1 k Ω	50 pF or	Open	Closed	
t _{en}	tPZL	1 K22	150 pF	Closed	Open	
	tPHZ	1 k Ω	50 pF	Open	Closed	
^t dis	tPLZ	1 K22	50 pr	Closed	Open	
t _{pd} or t _t			50 pF or 150 pF	Open	Open	





VOLTAGE WAVEFORMS
SETUP AND HOLD AND INPUT RISE AND FALL TIMES





VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT RISE AND FALL TIMES

VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES FOR 3-STATE OUTPUTS

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

- 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, $Z_O = 50 \Omega$, $t_f = 6$ ns.
- D. The outputs are measured one at a time with one input transition per measurement.
- E. tpLz and tpHz are the same as tdis.
- F. tpzL and tpzH are the same as ten.
- G. tpLH and tpHL are the same as tpd.

Figure 1. Load Circuit and Voltage Waveforms









PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN74HCT573DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573DBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573DBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74HCT573N3	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI
SN74HCT573NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74HCT573NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573NSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573PW	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573PWE4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573PWG4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573PWRE4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HCT573PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

(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.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check



PACKAGE OPTION ADDENDUM

18-Sep-2008

http://www.ti.com/productcontent for the latest availability information and additional product content details.

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)

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

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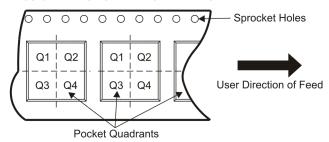
TAPE AND REEL INFORMATION



TAPE DIMENSIONS + K0 - P1 - B0 W Cavity - A0 -

A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

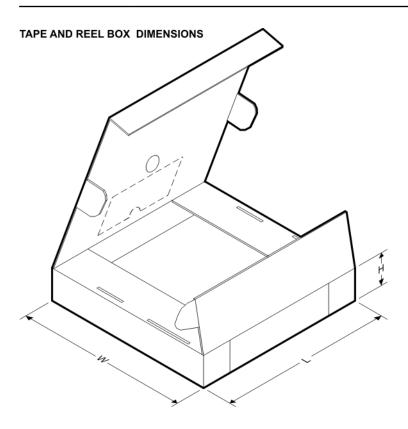
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN74HCT573DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74HCT573DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74HCT573NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74HCT573PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1





*All dimensions are nominal

7 III GIITOTO GI O TIOTIII GI							
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HCT573DBR	SSOP	DB	20	2000	346.0	346.0	33.0
SN74HCT573DWR	SOIC	DW	20	2000	346.0	346.0	41.0
SN74HCT573NSR	SO	NS	20	2000	346.0	346.0	41.0
SN74HCT573PWR	TSSOP	PW	20	2000	346.0	346.0	33.0

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

MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



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.



PW (R-PDSO-G**)

14 PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



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-153

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
- D. Falls within JEDEC MS-013 variation AC.



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.



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