SCLS375E - JUNE 1997 - REVISED APRIL 2002

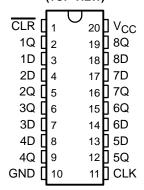
- Inputs Are TTL-Voltage Compatible
- Contain Eight Flip-Flops With Single-Rail Outputs
- Direct Clear Input
- Individual Data Input to Each Flip-Flop
- Applications Include:
 - Buffer/Storage Registers
 - Shift Registers
 - Pattern Generators
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

description

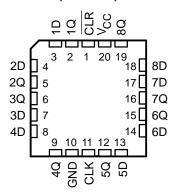
These devices are positive-edge-triggered D-type flip-flops with a direct clear (CLR) input.

Information at the data (D) inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock (CLK) pulse. Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse. When CLK is at either the high or low level, the D input has no effect at the output.

SN54AHCT273 . . . J OR W PACKAGE SN74AHCT273 . . . DB, DGV, DW, N, NS, OR PW PACKAGE (TOP VIEW)



SN54AHCT273 . . . FK PACKAGE (TOP VIEW)



ORDERING INFORMATION

TA	PACK	AGE†	ORDERABLE PART NUMBER	TOP-SIDE MARKING		
	PDIP – N	Tube	SN74AHCT273N	SN74AHCT273N		
–40°C to 85°C	SOIC - DW	Tube	SN74AHCT273DW	AHCT273		
	30IC = DW	Tape and reel	SN74AHCT273DWR	AUC12/3		
	SOP – NS Tape and reel		SN74AHCT273NSR	AHCT273		
	SSOP – DB	Tape and reel	SN74AHCT273DBR	HB273		
	TSSOP – PW Tape and reel		SN74AHCT273PWR	HB273		
	TVSOP - DGV	Tape and reel	SN74AHCT273DGVR	HB273		
	CDIP – J	Tube	SNJ54AHCT273J	SNJ54AHCT273J		
–55°C to 125°C	CFP – W	Tube	SNJ54AHCT273W	SNJ54AHCT273W		
	LCCC – FK	Tube	SNJ54AHCT273FK	SNJ54AHCT273FK		

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



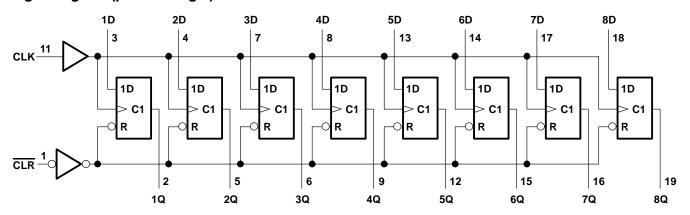
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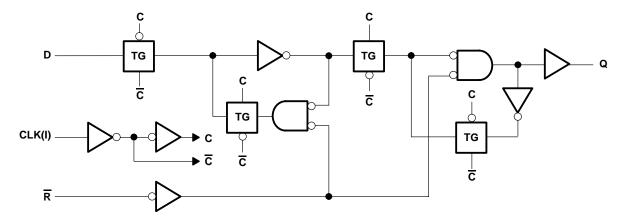
FUNCTION TABLE (each flip-flop)

	INPUTS	OUTPUT	
CLR	CLK	D	Q
L	Х	Χ	L
Н	\uparrow	Н	Н
Н	\uparrow	L	L
Н	L	Χ	Q_0

logic diagram (positive logic)



logic diagram, each flip-flop (positive logic)





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

Supply voltage range, V _{CC}		–0.5 V to 7 V
Input voltage range, V _I (see Note 1)		0.5 V to 7 V
Output voltage range, VO (see Note 1)		. -0.5 V to V _{CC} + 0.5 V
Input clamp current, I _{IK} (V _I < 0)		–20 mA
Output clamp current, IOK (VO < 0 or VO > VCO	c)	±20 mA
Continuous output current, $I_O(V_O = 0 \text{ to } V_{CC})$	·	±25 mA
Continuous current through V _{CC} or GND		±75 mA
Package thermal impedance, θ _{JA} (see Note 2):	: DB package	70°C/W
•	DGV package	92°C/W
	DW package	58°C/W
	N package	69°C/W
	NS package	60°C/W
	PW package	83°C/W
Storage temperature range, T _{stg}		–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.

recommended operating conditions (see Note 3)

		SN54AH	CT273	SN74AH	CT273	LINUT
		MIN MAX 4.5 5.5 2 0.8 0 5.5 0 VCC -8 8 20	MIN	MAX	UNIT	
Vcc	Supply voltage	4.5	5.5	4.5	5.5	V
VIH	High-level input voltage	2	3	2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
VI	Input voltage	0	5.5	0	5.5	V
٧o	Output voltage	0	Vcc	0	Vcc	V
loh	High-level output current	20	-8		-8	mA
l _{OL}	Low-level output current	0	8		8	mA
Δt/Δν	Input transition rise or fall time	Q	20		20	ns/V
TA	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.

SN54AHCT273, SN74AHCT273 OCTAL D-TYPE FLIP-FLOPS WITH CLEAR

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

PARAMETER	TEST CONDITIONS	vcc	T,	գ = 25°C	;	SN54AH	CT273	SN74AH	UNIT	
PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
V	I _{OH} = -50 μA	451/	4.4	4.5		4.4		4.4		٧
VOH	$I_{OH} = -8 \text{ mA}$	4.5 V	3.94			3.8	P.	3.8		٧
M	I _{OL} = 50 μA	45.77			0.1		0.1		0.1	.,
VOL	I _{OL} = 8 mA	4.5 V			0.36	į	0.44		0.44	٧
lį	$V_I = 5.5 \text{ V or GND}$	0 V to 5.5 V			±0.1	<i>\(\frac{1}{2} \)</i>	±1*		±1	μΑ
^I CC	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4	372	40		40	μΑ
ΔI _{CC} †	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35	P. P	1.5		1.5	mA
Ci	V _I = V _{CC} or GND	5 V		2.5	10				10	pF

^{*} On products compliant to MIL-PRF-38535, this parameter is not production tested at $V_{CC} = 0 \text{ V}$.

timing requirements over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (unless otherwise noted) (see Figure 1)

			T _A =	25°C	SN54AH	ICT273	SN74AH	CT273	UNIT	
			MIN	MAX	MIN	MAX	MIN	MAX	UNIT	
A Dulas duration		CLR low	5		6		6		20	
t _w	Pulse duration	CLK high or low			6.5	(C)	6.5		ns	
	Catura tima	Data before CLK↑	5		5		5			
t _{su}	Setup time	CLR before CLK↑	2.5		2.5	,	2.5		ns	
t _h	Hold time, data after CLK↑		0		0		0		ns	

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	LOAD	T	A = 25°C	;	SN54Al	HCT273	SN74AH	ICT273	UNIT
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	ONIT
f			C _L = 15 pF	75**	120**		65**		65		MHz
f _{max}			C _L = 50 pF	50	75		45	7	45		IVITIZ
t _{PHL}	CLR	Q	C _L = 15 pF		7.5**	10**	1**	11.6**	1	11.6	ns
^t PLH	CLK		C: -15 pE		5.5**	7.5**	1**	8.8**	1	8.8	ns
^t PHL	CLK	Q	C _L = 15 pF		5.8**	8.2**	1**	10**	1	10	115
^t PHL	CLR	Q	C _L = 50 pF		8.5	11	777	12.6	1	12.6	ns
^t PLH	CLK		C: - 50 pF		6.5	8.5	0 1	9.8	1	9.8	no
^t PHL	CLK	Q	C _L = 50 pF		6.8	9.2	2 1	11	1	11	ns
^t sk(o)			C _L = 50 pF			1***				1	ns

^{**} On products compliant to MIL-PRF-38535, this parameter is not production tested.



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

^{***} On products compliant to MIL-PRF-38535, this parameter does not apply.

noise characteristics, V_{CC} = 5 V, C_L = 50 pF, T_A = 25°C (see Note 4)

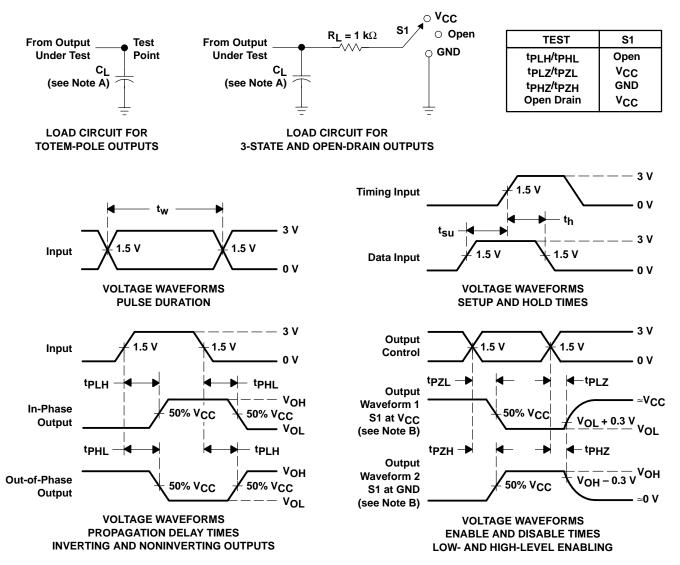
	PARAMETER	SN7	SN74AHCT273			
	PARAMETER	MIN TYP MAX 0.76 -0.48 4.4	UNIT			
V _{OL(P)}	Quiet output, maximum dynamic V _{OL}		0.76		V	
V _{OL(V)}	Quiet output, minimum dynamic V _{OL}		-0.48		V	
VOH(V)	Quiet output, minimum dynamic VOH	4.4			V	
VIH(D)	High-level dynamic input voltage	2			V	
V _{IL(D)}	Low-level dynamic input voltage			0.8	V	

NOTE 4: Characteristics are for surface-mount packages only.

operating characteristics, $T_A = 25^{\circ}C$

	PARAMETER	TEST C	ONDITIONS	TYP	UNIT
C _{pd}	Power dissipation capacitance	No load,	f = 1 MHz	27	pF

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig 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. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, $Z_O = 50 \Omega$, $t_f \leq 3$ ns. $t_f \leq 3$ ns.
- D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms







10-Jun-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing		Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
SN74AHCT273DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB273	Samples
SN74AHCT273DBRG4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB273	Samples
SN74AHCT273DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT273	Samples
SN74AHCT273DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT273	Samples
SN74AHCT273DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT273	Samples
SN74AHCT273N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT273N	Samples
SN74AHCT273NSR	ACTIVE	so	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT273	Samples
SN74AHCT273PWR	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB273	Samples
SN74AHCT273PWRG4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB273	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.



PACKAGE OPTION ADDENDUM

10-Jun-2014

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

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TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	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

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

All differsions are norminal												
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
SN74AHCT273DBR	SSOP	DB	20	2000	330.0	16.4	8.2	7.5	2.5	12.0	16.0	Q1
SN74AHCT273DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74AHCT273NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1
SN74AHCT273PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT273DBR	SSOP	DB	20	2000	367.0	367.0	38.0
SN74AHCT273DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74AHCT273NSR	SO	NS	20	2000	367.0	367.0	45.0
SN74AHCT273PWR	TSSOP	PW	20	2000	367.0	367.0	38.0

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- 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.



DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.

- 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.



DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Refer to IPC7351 for alternate board design.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate design.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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



- 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.



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