



## U74AHCT273

Advance

CMOS IC

### OCTAL D-TYPE FLIP-FLOPS WITH CLEAR

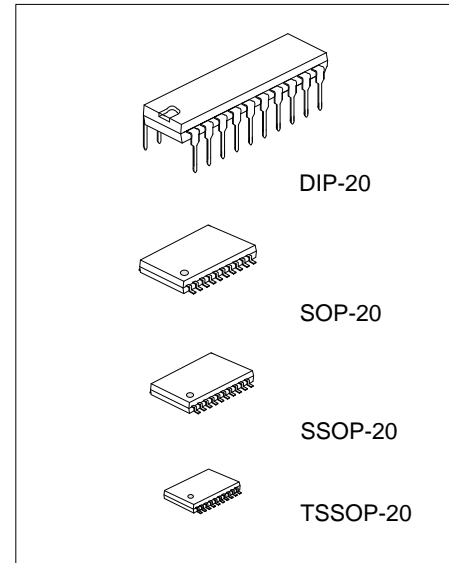
#### DESCRIPTION

The **U74AHCT273** devices are positive-edge-triggered D-type flip-flops with a direct active low 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 related directly 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.

#### FEATURES

- \* Operating Voltage Range of 4.5V to 5.5V
- \* Inputs are TTL-Voltage Compatible
- \* ±8mA Output Drive at 5V
- \* Contain Eight Flip-Flops With Single-Rail Outputs
- \* Direct Clear Input
- \* Individual Data Input to Each Flip-Flop



#### ORDERING INFORMATION

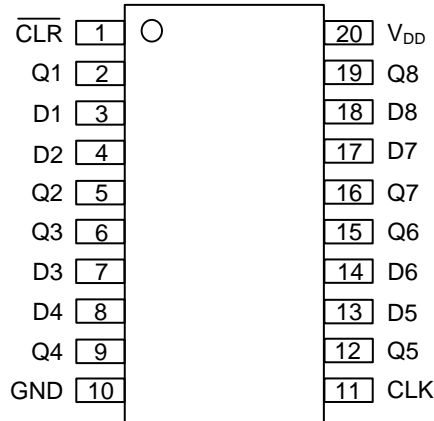
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AHCT273L-D20-T	U74AHCT273G-D20-T	DIP-20	Tube
U74AHCT273L-P20-R	U74AHCT273G-P20-R	TSSOP-20	Tape Reel
U74AHCT273L-R20-R	U74AHCT273G-R20-R	SSOP-20	Tape Reel
U74AHCT273L-S20-R	U74AHCT273G-S20-R	SOP-20	Tape Reel

<p>U74AHCT273G-D20-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) D20: DIP-20, P20: TSSOP-20, R20: SSOP-20, S20: SOP-20 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
---	--

#### MARKING

DIP-20	SOP-20 / SSOP-20 / TSSOP-20
<p>UTC □□□□ → Date Code L: Lead Free G: Halogen Free □□ → Lot Code</p>	<p>UTC □□□□ → Date Code L: Lead Free G: Halogen Free □□ → Lot Code</p>

## PIN CONFIGURATION

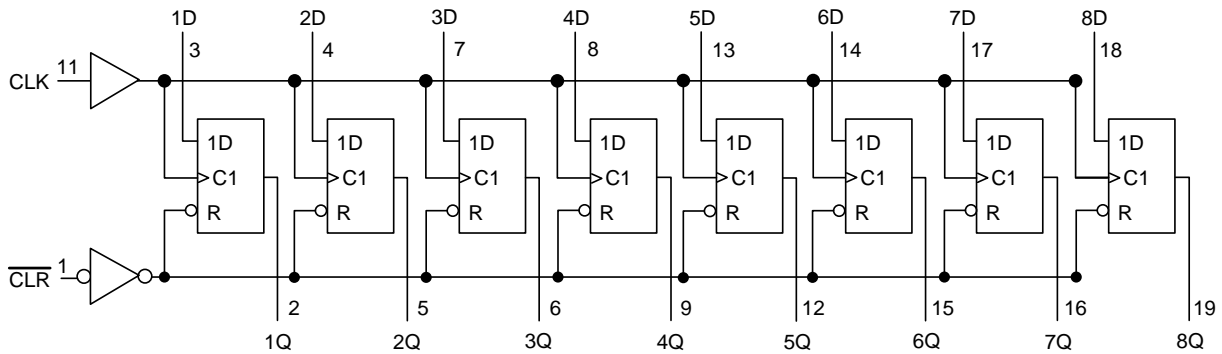


## FUNCTION TABLE

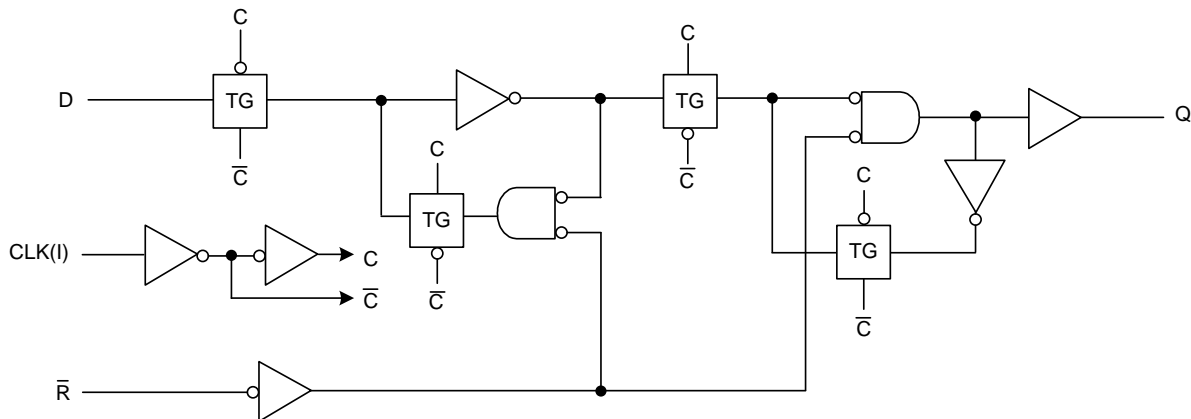
INPUTS			OUTPUT
CLR	CLK	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q <sub>0</sub>

H = High voltage level ; L = Low voltage level ; X = Don't care

## FUNCTIONAL BLOCK DIAGRAM



## LOGIC DIAGRAM, EACH FLIP-FLOP (POSITIVE LOGIC)



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	$V_{CC}$		-0.5 ~ 7	V
Input Voltage Range	$V_I$		-0.5 ~ 7	V
Output Voltage Range	$V_O$		-0.5 ~ $V_{CC} + 0.5$	V
Continuous Output Current	$I_{OUT}$	$V_{OUT}=0 \sim V_{CC}$	$\pm 25$	mA
Input Clamp Current	$I_{IK}$	$V_{IN} < 0$ or $V_{IN} < V_{CC}$	$\pm 20$	mA
Output Clamp Current	$I_{OK}$	$V_{IN} < 0$ or $V_{OUT} > V_{CC}$	$\pm 20$	mA
Continuous Current Through $V_{CC}$ or GND			$\pm 75$	mA
Operating Temperature	$T_A$		-40 ~ +125	°C
Storage Temperature Range	$T_{STG}$		-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$		4.5	5	5.5	V
High-Level Input Voltage	$V_{IH}$	$V_{CC}=4.5\sim 5.5V$	2			V
Low-Level Input Voltage	$V_{IL}$	$V_{CC}=4.5\sim 5.5V$			0.8	V
Input Voltage	$V_{IN}$		0		5.5	V
Output Voltage	$V_{OUT}$		0		$V_{CC}$	V
High-Level output current	$I_{OH}$		-8			mA
Low-Level output current	$I_{OL}$				8	mA

### ■ ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Output Voltage	$V_{OH}$	$V_{CC}=4.5V, I_{OH}=-50\mu A$	4.4	4.5		V
		$V_{CC}=4.5V, I_{OH}=-8mA$	3.94			
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=4.5V, I_{OL}=50\mu A$			0.1	V
		$V_{CC}=4.5V, I_{OL}=8mA$			0.36	
Input Leakage Current	$I_{I(LEAK)}$	$V_I = V_{CC}$ or GND			$\pm 0.1$	$\mu A$
Quiescent Supply Current	$I_{CC}$	$V_{CC}=5.5V, V_I = V_{CC}$ or GND, $I_{OUT}=0$			4	$\mu A$
Additional Quiescent Supply Current (Note)	$\Delta I_{CC}$	$V_{CC}=5.5V$ , One input at 3.4V, Other Inputs at $V_{CC}$ or GND.			1.35	mA
Input Capacitance	$C_I$	$V_{CC}=5V, V_I = V_{CC}$ or GND		3	10	pF

Note: The increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or  $V_{CC}$ .

■ **SWITCHING CHARACTERISTICS** ( $V_{CC}=5V\pm 0.5V$ ,  $T_A=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Maximum clock pulse frequency	$f_{MAX}$	$C_L=15pF$	75	120		MHz
		$C_L=50pF$	50	75		MHz
Propagation delay from input ( $\overline{CLR}$ ) to output (Q)	$t_{PHL}$	$C_L=15pF$		7.5	10	ns
		$C_L=50pF$		8.5	11	ns
Propagation delay from input (CLK) to output (Q)	$t_{PLH}$	$C_L=15pF$		5.5	7.5	ns
		$C_L=50pF$		6.5	8.5	ns
	$t_{PHL}$	$C_L=15pF$		5.8	8.2	ns
		$C_L=50pF$		6.8	9.2	ns
Propagation delay	$t_{SK(O)}$	$C_L=50pF$			1	ns

■ **TIMING REQUIREMENTS** ( $V_{CC}=5V\pm 0.5V$ ,  $T_A=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Pulse duration	$t_w$	CLK high or low	5			ns
		$\overline{CLR}$ low	5			ns
Setup time before CLK $\uparrow$	$t_{SU}$	Data before CLK $\uparrow$	5			ns
		$\overline{CLR}$ before CLK $\uparrow$	3			ns
Hold time ,data after CLK $\uparrow$	$t_h$		1			ns

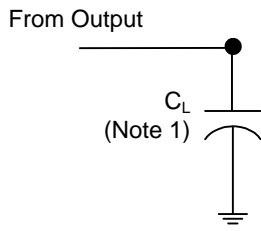
■ **NOISE CHARACTERISTICS** ( $V_{CC}=5V$ ,  $C_L=50pF$ ,  $T_A=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Quiet output, maximum dynamic $V_{OL}$	$V_{OL(P)}$			7.6		V
Quiet output, minimum dynamic $V_{OL}$	$V_{OL(V)}$			-0.48		V
Quiet output, minimum dynamic $V_{OH}$	$V_{OH(V)}$		4.4			V
High-level dynamic input voltage	$V_{IH(D)}$		2			V
Low-level dynamic input voltage	$V_{IL(D)}$				0.8	V

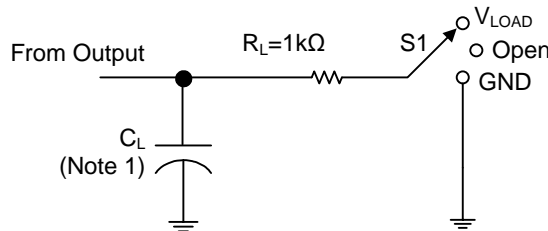
■ **OPERATING CHARACTERISTICS** ( $T_A=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance per flip-flop	$C_{PD}$	$f=1MHz$ , No load.		27		pF

## TEST CIRCUIT AND WAVEFORMS

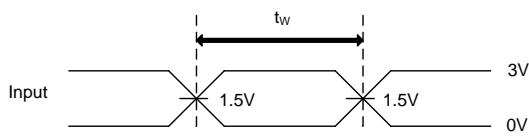


Load Circuit

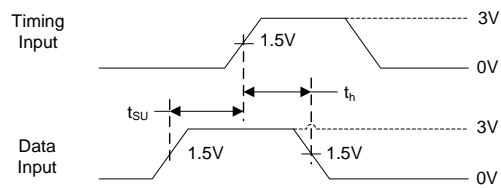


Test Circuit

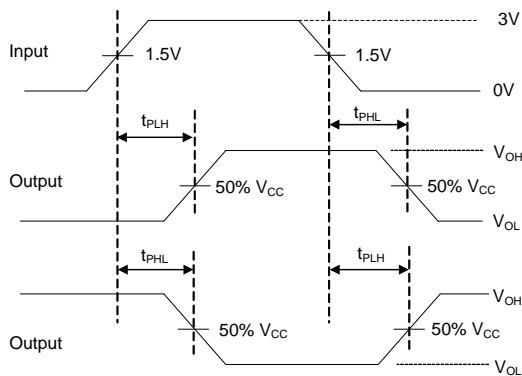
TEST	S1
$t_{PLZ}/t_{PZL}$	Open
$t_{PLZ}/t_{PZL}$	$V_{CC}$
$t_{PHZ}/t_{PZH}$	GND
Open Drain	$V_{CC}$



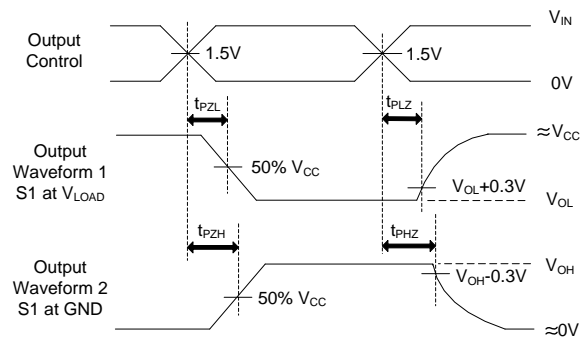
PULSE DURATION



SETUP AND HOLD TIMES



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Notes: 1.  $C_L$  includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: PRR  $\leq 1MHz$ ,  $Z_O = 50\Omega$ ,  $t_r = 3 ns$ ,  $t_f = 3 ns$ .

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.