



U74HC273

CMOS IC

OCTAL D-TYPE FLIP-FLOPS WITH CLEAR

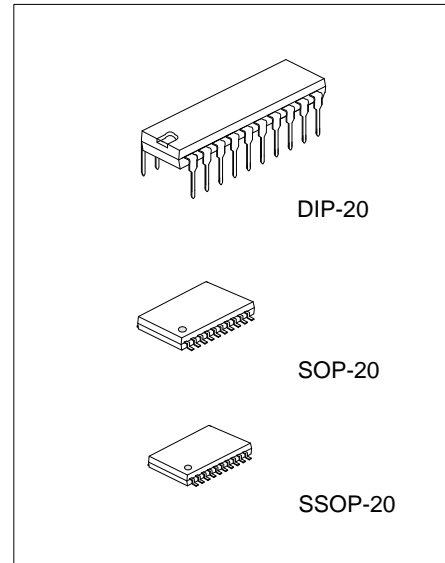
DESCRIPTION

The **U74HC273** 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

- * Wide Operating Voltage Range of 2 V to 6 V
- * Low Power Consumption, 80- μ A Maximum ICC
- * Typical $t_{PD} = 12$ ns
- * ± 4 mA Output Drive at 5 V
- * Low Input Current of 1 μ A Maximum
- * Contain Eight Flip-Flops With Single-Rail Outputs
- * Direct Clear Input
- * Individual Data Input to Each Flip-Flop

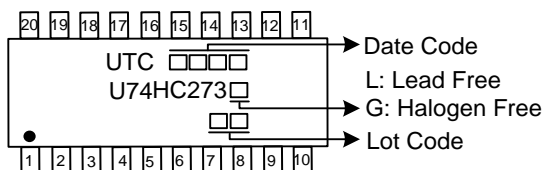


ORDERING INFORMATION

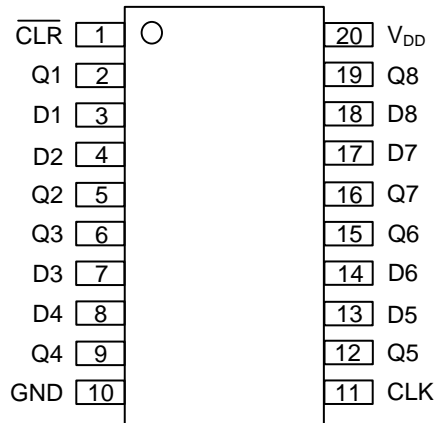
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC273L-D20-T	U74HC273G-D20-T	DIP-20	Tube
U74HC273L-R20-R	U74HC273G-R20-R	SSOP-20	Tape Reel
U74HC273L-S20-R	U74HC273G-S20-R	SOP-20	Tape Reel

<p>U74HC273G-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, R20: SSOP-20, S20: SOP-20 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	---

MARKING



■ PIN CONFIGURATION

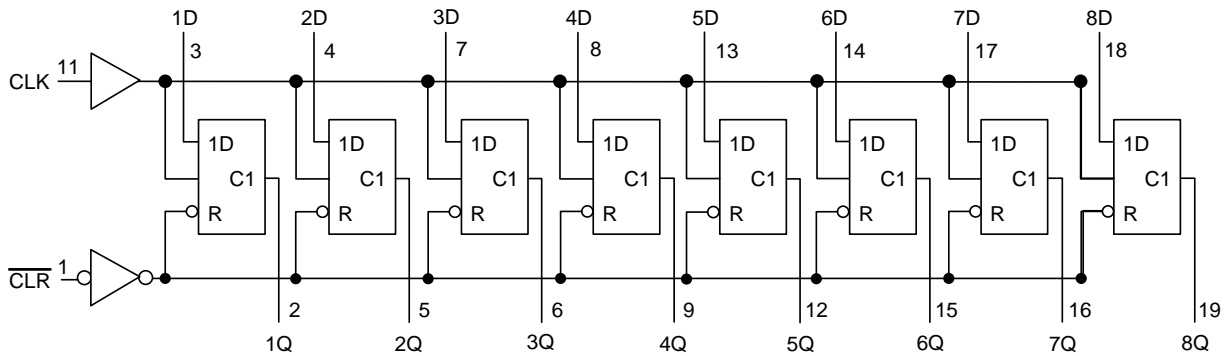


■ FUNCTION TABLE

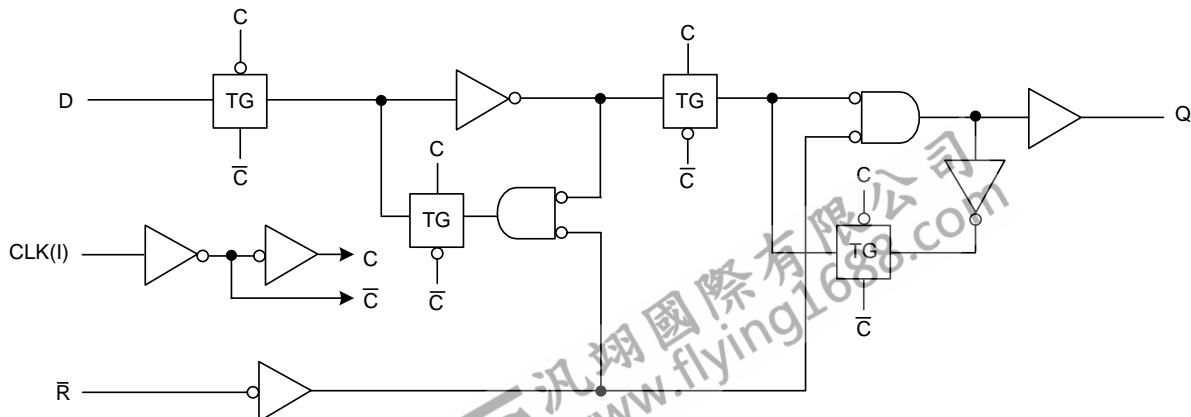
INPUTS			OUTPUT
CLR	CLK	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q ₀

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
Continuous Output Current	I_{OUT}	$V_{OUT}=0 \sim V_{CC}$	± 25	mA
Input Clamp Current	I_{IK}	$V_{IN}<0$ or $V_{IN}<V_{CC}$	± 20	mA
Output Clamp Current	I_{OK}	$V_{IN}<0$ or $V_{OUT}>V_{CC}$	± 20	mA
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 COMDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2	5	6	V
High-Level Input Voltage	V_{IH}	$V_{CC}=2V$	1.5			V
		$V_{CC}=4.5V$	3.15			
		$V_{CC}=6V$	4.2			
Low-Level Input Voltage	V_{IL}	$V_{CC}=2V$			0.5	V
		$V_{CC}=4.5V$			1.35	
		$V_{CC}=6V$			1.8	
Input Voltage	V_{IN}		0		V_{CC}	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=2V$			1000	ns/V
		$V_{CC}=4.5V$			500	
		$V_{CC}=6V$			400	
Operating Temperature	T_A		-40		+85	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP ⁽¹⁾	MAX	UNIT
High-Level Output Voltage	V_{OH}	$V_{CC}=2V, I_{OH}=-20\mu A$	1.9	1.998		V
		$V_{CC}=4.5V, I_{OH}=-20\mu A$	4.4	4.499		
		$V_{CC}=6V, I_{OH}=-20\mu A$	5.9	5.999		
		$V_{CC}=4.5V, I_{OH}=-4mA$	3.98	4.3		
		$V_{CC}=6V, I_{OH}=-5.2mA$	5.48	5.8		
Low-Level Output Voltage	V_{OL}	$V_{CC}=2V, I_{OL}=20\mu A$		0.002	0.1	V
		$V_{CC}=4.5V, I_{OL}=20\mu A$		0.001	0.1	
		$V_{CC}=6V, I_{OL}=20\mu A$		0.001	0.1	
		$V_{CC}=4.5V, I_{OL}=4mA$		0.17	0.26	
		$V_{CC}=6V, I_{OL}=5.2mA$		0.15	0.26	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=6V, V_I=V_{CC}$ or 0		± 0.1	± 100	μA
Quiescent Supply Current	I_{CC}	$V_{CC}=6V, V_I=V_{CC}$ or 0, $I_{OUT}=0$			8	μA
Input Capacitance	C_I	$V_{CC}=2V\sim 6V$		3	10	pF

■ **SWITCHING CHARACTERISTICS** ($C_L=50pF$, $T_A=25^{\circ}C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Maximum clock pulse frequency	f_{MAX}	$V_{CC}=2.0V$	5	11		MHz
		$V_{CC}=4.5V$	27	50		MHz
		$V_{CC}=6.0V$	32	60		MHz
Propagation delay from input (CLR) to output (Any)	t_{PHL}	$V_{CC}=2.0V$		55	160	ns
		$V_{CC}=4.5V$		15	32	ns
		$V_{CC}=6.0V$		12	27	ns
Propagation delay from input (CLK) to output (Any)	t_{PD}	$V_{CC}=2.0V$		56	160	ns
		$V_{CC}=4.5V$		15	32	ns
		$V_{CC}=6.0V$		13	27	ns
Propagation delay to output (Any)	t_t	$V_{CC}=2.0V$		38	75	ns
		$V_{CC}=4.5V$		8	15	ns
		$V_{CC}=6.0V$		6	13	ns

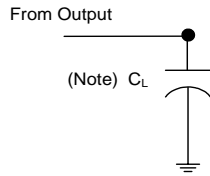
■ **TIMING REQUIREMENTS** (Input: $t_R, t_F \leq 2.5ns$; $PRR \leq 1MHz$)

PARAMETER	SYMBOL	Conditions	MIN	TYP	MAX	UNIT
Clock frequency	f_{CLOCK}	$V_{CC}=2V$			5	MHZ
		$V_{CC}=4.5V$			27	MHZ
		$V_{CC}=6V$			32	MHZ
Pulse duration	CLK high or low	$V_{CC}=2V$		80		ns
		$V_{CC}=4.5V$		16		ns
		$V_{CC}=6V$		14		ns
	CLR low	$V_{CC}=2V$		80		ns
		$V_{CC}=4.5V$		16		ns
		$V_{CC}=6V$		14		ns
Setup time before CLK↑	Data	$V_{CC}=2V$		100		ns
		$V_{CC}=4.5V$		20		ns
		$V_{CC}=6V$		17		ns
	CLR inactive	$V_{CC}=2V$		100		ns
		$V_{CC}=4.5V$		20		ns
		$V_{CC}=6V$		17		ns
Hold time ,data after CLK↑	t_H	$V_{CC}=2V$		0		ns
		$V_{CC}=4.5V$		0		ns
		$V_{CC}=6V$		0		ns

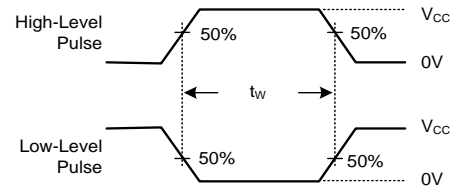
■ **OPERATING CHARACTERISTICS** ($T_A=25^{\circ}C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance per flip-flop	C_{PD}	No load.		35		pF

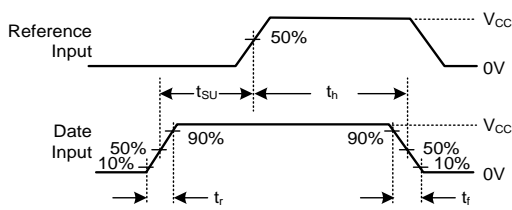
■ TEST CIRCUIT AND WAVEFORMS



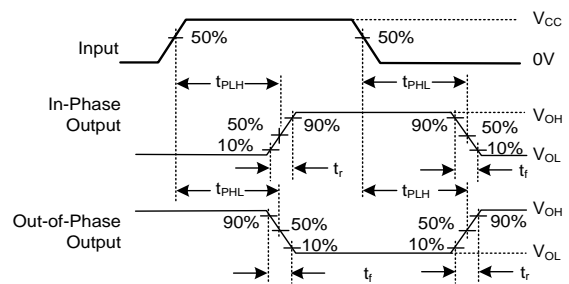
Load Circuit



Voltage Waveforms Pulse Durations



Voltage Waveforms Setup and Hold Times



Voltage Waveforms Propagation Delay and Output Transition Times

- Notes: 1. C_L includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, $Z_O = 50\Omega$, $t_r = 6$ ns, $t_f = 6$ ns.
3. For clock inputs, fmax is measured when the input duty cycle is 50%.
4. The outputs are measured one at a time with one input transition per measurement.

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.