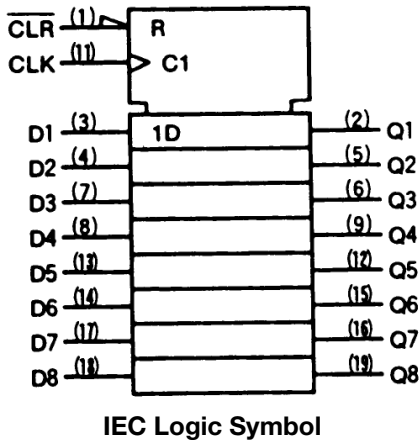


Octal D-Type Flip-Flop with Clear

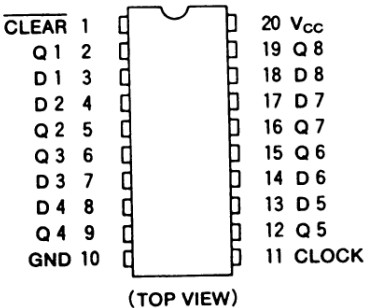
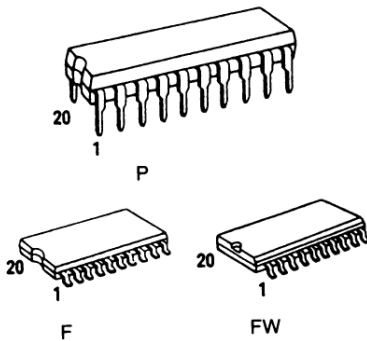
The TC74HC273A is a high speed CMOS OCTAL D-TYPE FLIP-FLOP fabricated with silicon gate C²MOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. Information signals applied to D inputs are transferred to the Q outputs on the positive going edge of the clock pulse. When the CLEAR input is held low, the Q outputs are at a low logic level independent of the other inputs. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

Features

- High Speed: $f_{MAX} = 48\text{MHz(Typ.)}$ at $V_{CC} = 5\text{V}$
- Low Power Dissipation: $I_{CC} = 4\mu\text{A(Max.)}$ at $T_a = 25^\circ\text{C}$
- High Noise Immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}(\text{Min.})$
- Output Drive Capability: 10 LSTTL Loads
- Symmetrical Output Impedance: $|I_{OH}| = I_{OL} = 4\text{mA}(\text{Min.})$
- Balanced Propagation Delays: $t_{pLH} = t_{pHL}$
- Wide Operating Voltage Range: $V_{CC}(\text{opr}) = 2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 74LS273



IEC Logic Symbol



(TOP VIEW)

Pin Assignment

Truth Table

Inputs			Outputs	Functions
CLEAR	D	CLOCK	Q	
L	X	X	L	Clear
H	L		L	—
H	H		H	—
H	X		Q _n	No change

X: Don't Care

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Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage Range	V_{CC}	-0.5 ~ 7	V
DC Input Voltage	V_{IN}	-0.5 ~ $V_{CC} + 0.5$	V
DC Output Voltage	V_{OUT}	-0.5 ~ $V_{CC} + 0.5$	V
Input Diode Current	I_{IK}	± 20	mA
Output Diode Current	I_{OK}	± 20	mA
DC Output Current	I_{OUT}	± 25	mA
DC V_{CC} /Ground Current	I_{CC}	± 50	mA
Power Dissipation	P_D	500(DIP)* / 180(MFP)	mW
Storage Temperature	T_{stg}	-65 ~ 150	°C
Lead Temperature 10sec	T_L	300	°C

*500mW in the range of $T_a = -40^\circ\text{C} \sim 65^\circ\text{C}$. From $T_a = 65^\circ\text{C}$ to 85°C a derating factor of -10mW/°C shall be applied until 300mW.

Recommended Operating Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	2 ~ 6	V
Input Voltage	V_{IN}	0 ~ V_{CC}	V
Output Voltage	V_{OUT}	0 ~ V_{CC}	V
Operating Temperature	T_{opr}	-40 ~ 85	°C
Input Rise and Fall Time	t_r, t_f	0 ~ 1000($V_{CC} = 2.0\text{V}$) 0 ~ 500($V_{CC} = 4.5\text{V}$) 0 ~ 400($V_{CC} = 6.0\text{V}$)	ns

DC Electrical Characteristics

Parameter	Symbol	Test Condition		Ta = 25°C			Ta = -40 ~ 85°C		Unit	
				V _{CC}	Min.	Typ.	Max.	Min.		Max.
High-Level Input Voltage	V _{IH}	—		2.0 4.5 6.0	1.5 3.15 4.2	— — —	— — —	1.5 3.15 4.2	V	
Low-Level Input Voltage	V _{IL}	—		2.0 4.5 6.0	— — —	— — —	0.5 1.35 1.8	— — —	0.5 1.35 1.8	
High-Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -20μA	2.0	1.9	2.0	—	1.9	—	V
				4.5	4.4	4.5	—	4.4	—	
			I _{OH} = -4 mA I _{OH} = -5.2mA	6.0	5.9	6.0	—	5.9	—	
				4.5	4.18	4.31	—	4.13	—	
Low-Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 20μA	2.0	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
			I _{OL} = 4 mA I _{OL} = 5.2mA	6.0	—	0.0	0.1	—	0.1	
				4.5	—	0.17	0.26	—	0.33	
Input Leakage Current	I _{CC}	V _{IN} = V _{CC} or GND	6.0	—	—	4.0	—	40.0	μA	
										6.0

Timing Requirements (Input $t_r = t_f = 6\text{ns}$)

Parameter	Symbol	Test Condition	Ta = 25°C			Unit
			V _{CC}	Typ.	Limit	
Minimum Pulse Width (CLOCK)	$t_{W(L)}$ $t_{W(H)}$	—	2.0	—	75	ns
			4.5	—	15	
			6.0	—	13	
Minimum Pulse Width (CLEAR)	$t_{W(L)}$	—	2.0	—	75	
			4.5	—	15	
			6.0	—	13	
Minimum Setup Time	t_s	—	2.0	—	75	
			4.5	—	15	
			6.0	—	13	
Minimum Hold Time	t_h	—	2.0	—	0	
			4.5	—	0	
			6.0	—	0	
Minimum Removal Time (CLEAR)	t_{rem}	—	2.0	—	50	
			4.5	—	10	
			6.0	—	9	
Clock Frequency	f	—	2.0	—	6	MHz
			4.5	—	30	
			6.0	—	35	

AC Electrical Characteristics (C_L = 15pF, V_{CC} = 5V, Ta = 25°C)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Transition Time	t_{TLH} t_{THL}	—	—	4	8	ns
Propagation Delay Time (CLOCK-Q)	t_{pLH} t_{pHL}	—	—	12	22	
Propagation Delay Time (CLEAR-Q)	t_{pLH} t_{pHL}	—	—	10	18	
Maximum Clock Frequency	f_{MAX}	—	40	67	—	MHz

AC Electrical Characteristics (C_L = 50pF, Input $t_r = t_f = 6\text{ns}$)

Parameter	Symbol	Test Condition	Ta = 25°C				Ta = -40 ~ 85°C		Unit
			V _{CC}	Min.	Typ.	Max.	Min.	Max.	
Output Transition Time	t _{TLH} t _{THL}	—	2.0	—	25	75	—	95	ns
			4.5	—	7	15	—	19	
			6.0	—	6	13	—	16	
Propagation Delay Time (CLOCK-Q)	t _{pLH} t _{pHL}	—	2.0	—	54	145	—	180	
			4.5	—	18	29	—	36	
			6.0	—	15	25	—	31	
Propagation Delay Time (CLEAR-Q)	t _{pLH} t _{pHL}	—	2.0	—	60	160	—	200	
			4.5	—	20	32	—	40	
			6.0	—	17	27	—	34	
Maximum Clock Frequency	f _{MAX}	—	2.0	6	18	—	5	—	MHz
			4.5	30	56	—	24	—	
			6.0	35	66	—	28	—	
Input Capacitance	C _{IN}	-		—	5	10	—	10	pF
Power Dissipation Capacitance	C _{PD(1)}	-		—	43	—	—	—	

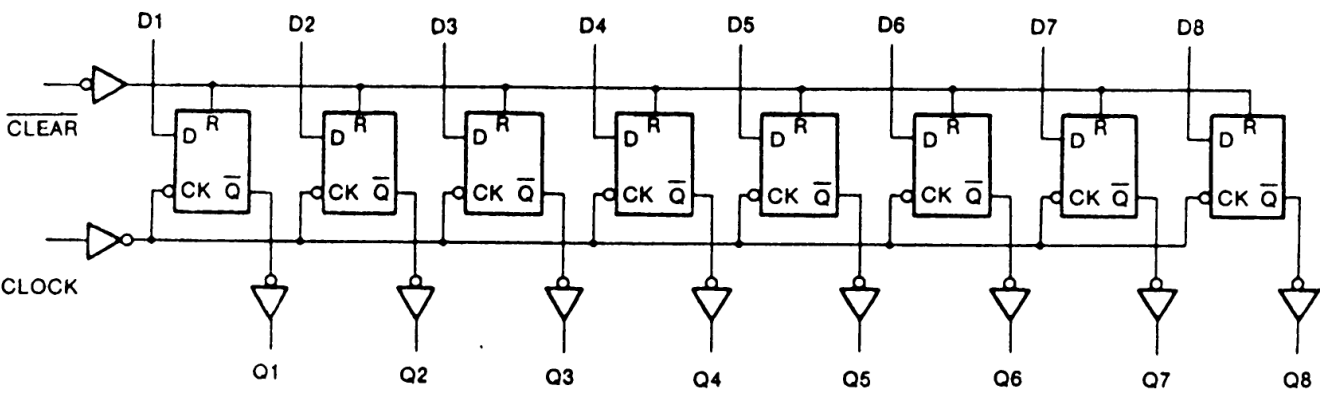
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8(\text{per Flip-Flop})$$

And the total C_{PD} when n pcs. of Flip-Flop operate can be gained by the following equation:

$$C_{PD}(\text{total}) = 32 + 11 \cdot n$$



Logic Diagram