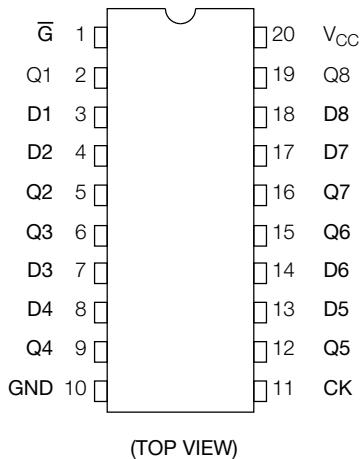


Features:

- **High Speed:** $f_{MAX} = 140\text{MHz}$ (typ.) at $V_{CC} = 5\text{V}$
- **Low Power Dissipation:** $I_{CC} = 8\mu\text{A}$ (max.) at $T_a = 25^\circ\text{C}$
- **High Noise Immunity:** $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min.)
- **Symmetrical Output Impedance:** $I_{OH} = I_{OL} = 24\text{mA}$ (min.). Capability of driving 50Ω transmission lines.
- **Balanced Propagation Delays:** $t_{pLH} = t_{pHL}$
- **Wide Operating Voltage Range:** V_{CC} (opr.) = $2\text{V}\sim 5.5\text{V}$
- **Pin and Function Compatible with 74F377**
- **Available in DIP, SOIC and SOP Packages**

Pin Assignment



The TC74AC377 is an advanced high speed CMOS OCTAL D-TYPE FLIP-FLOP fabricated with silicon gate and double-layer metal wiring $C^2\text{MOS}$ technology.

It achieves the high speed operation similar to equivalent Bipolar Schottky TTL, while maintaining the CMOS low power dissipation.

These 8-bit D-type flip-flops are controlled by a clock input (CK) and a output enable input (\overline{G}).

The signal level applied to the D inputs are transferred to Q outputs during the positive going transition of CK.

When the \overline{G} is high, the eight outputs are in a high impedance state.

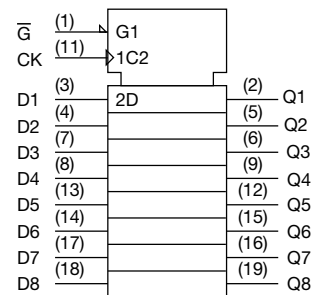
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

Truth Table

INPUTS			OUTPUT
\overline{G}	CLOCK	DATA	Q
H	X	X	NO CHANGE
L		L	L
L		H	H
X		X	NO CHANGE

X: Don't care

IEC Logic Symbol



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Absolute Maximum Ratings

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	-0.5-7.0	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}	± 50	mA
DC Output Current	I_{OUT}	± 50	mA
DC V_{CC} /Ground Current	I_{CC}	± 200	mA
Power Dissipation	P_D	500 (DIP) */180 (SOP)	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 $-10\text{mW}/^{\circ}\text{C}$ should be applied up to 300mW.

Recommended Operating Conditions

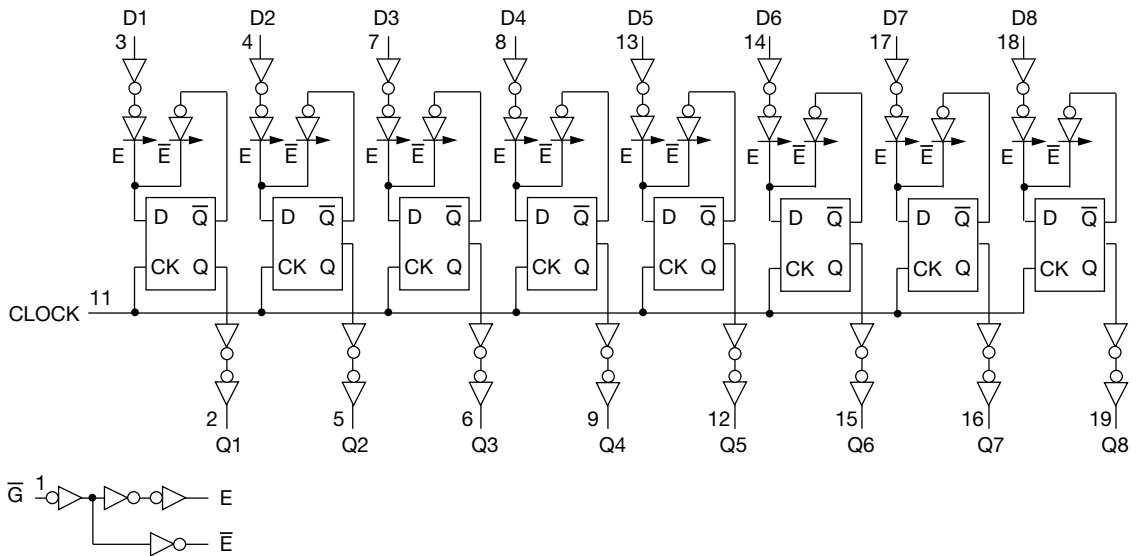
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0-5.5	V
Input Voltage	V_{IN}	0- V_{CC}	V
Output Voltage	V_{OUT}	0- V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C
Input Rise and Fall Time	dt/dv	0~100 ($V_{CC} = 3.3 \pm 0.3\text{V}$) 0~20 ($V_{CC} = 5 \pm 0.5\text{V}$)	ns/v

DC Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITION	$T_a = 25^{\circ}\text{C}$			$T_a = -40 \sim 85^{\circ}\text{C}$		UNIT			
			V_{CC}	Min.	Typ.	Max.	Min.		Max.		
High-Level Input Voltage	V_{IH}	—	2.0	1.50	—	—	1.50	—	V		
			3.0	2.10	—	—	2.10	—			
			5.5	3.85	—	—	3.85	—			
Low-Level Input Voltage	V_{IL}	—	2.0	—	—	0.50	—	0.50	V		
			3.0	—	—	0.90	—	0.90			
			5.5	—	—	1.65	—	1.65			
High-Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -50\mu\text{A}$	2.0	1.9	2.0	—	1.9	—	V	
				3.0	2.9	3.0	—	2.9	—		
				4.5	4.4	4.5	—	4.4	—		
				$I_{OH} = -4\text{mA}$	3.0	2.58	—	—	2.48		—
				$I_{OH} = -24\text{mA}$	4.5	3.94	—	—	3.80		—
Low-Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50\mu\text{A}$	2.0	—	0.0	0.1	—	0.1	V	
				3.0	—	0.0	0.1	—	0.1		
				4.5	—	0.0	0.1	—	0.1		
				$I_{OL} = 12\text{mA}$	3.0	—	—	0.36	—		0.44
				$I_{OL} = 24\text{mA}$	4.5	—	—	0.36	—		0.44
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC}$ or GND	5.5	—	—	± 0.1	—	± 1.0	μA		
										Quiescent Supply Current	I_{CC}

* This spec indicates the capability of driving 50Ω transmission lines.
One output should be tested at a time for a 10ms maximum duration.

System Diagram



Timing Requirements (Input $t_r = t_f = 3n$)

PARAMETER	SYMBOL	TEST CONDITION	Ta=25°C			Ta= -40-85°		UNIT
			V _{CC}	Typ.	Max.	Max.		
Minimum Pulse Width (CK)	$t_{W(L)}$	—	3.3±0.3	—	8.0	8.0		ns
	$t_{W(H)}$	—	5.0±0.5	—	5.0	5.0		
Minimum Set-up Time (D-CK)	$t_{W(L)}$	—	3.3±0.3	—	8.0	8.0		
			5.0±0.5	—	4.0	4.0		
Minimum Set-up Time (G-bar-CK)	t_s	—	3.3±0.3	—	9.0	9.0		
			5.0±0.5	—	4.0	4.0		
Minimum Hold Time	t_h	—	3.3±0.3	—	1.0	1.0		
			5.0±0.5	—	1.0	1.0		

AC Electrical Characteristics (C_L = 50pF, R_L = 500Ω, Input $t_r = t_f = 3ns$)

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40-85°C		UNIT	
			V _{CC}	Min.	Typ.	Max.	Min.		Max.
Propagation Delay Time (CK-Q)	t_{pLH}	—	3.0±0.3	—	10.6	17.6	1.0	20.0	ns
	t_{pHL}		5.0±0.5	—	7.4	10.6	1.0	12.0	
Maximum Clock Frequency	f_{MAX}	—	3.0±0.3	50	95	—	50	—	MHz
			5.0±0.5	80	140	—	80	—	
Input Capacitance	C _{IN}	—	—	—	5	10	—	10	pF
Power Dissipation Capacitance	C _{PD} ¹	—	—	—	30	—	—	—	

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: $I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 8$ (per F/F). And the total C_{PD} when n pcs. of Flip-Flop operate can be gained by the following equation: $C_{PD}(total) = 20 + 10 \cdot n$.

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