Features:

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

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

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

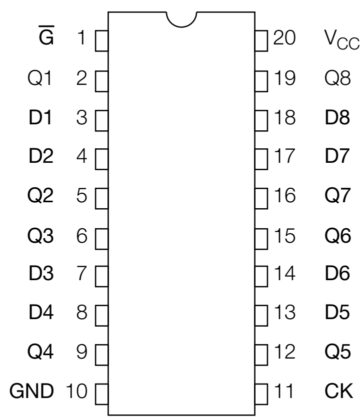
These 8-bit D-type flip-flops are controlled by a clock input (CK) and a output enable input ($\overline{G}$).

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.

Pin Assignment



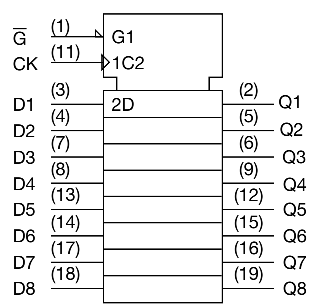
(TOP VIEW)

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



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 Ta = -40°C~65°C. From Ta = 65°C to 85°C a derating factor of -10mW/°C should be applied up to 300mW.

Recommended Operating Conditions

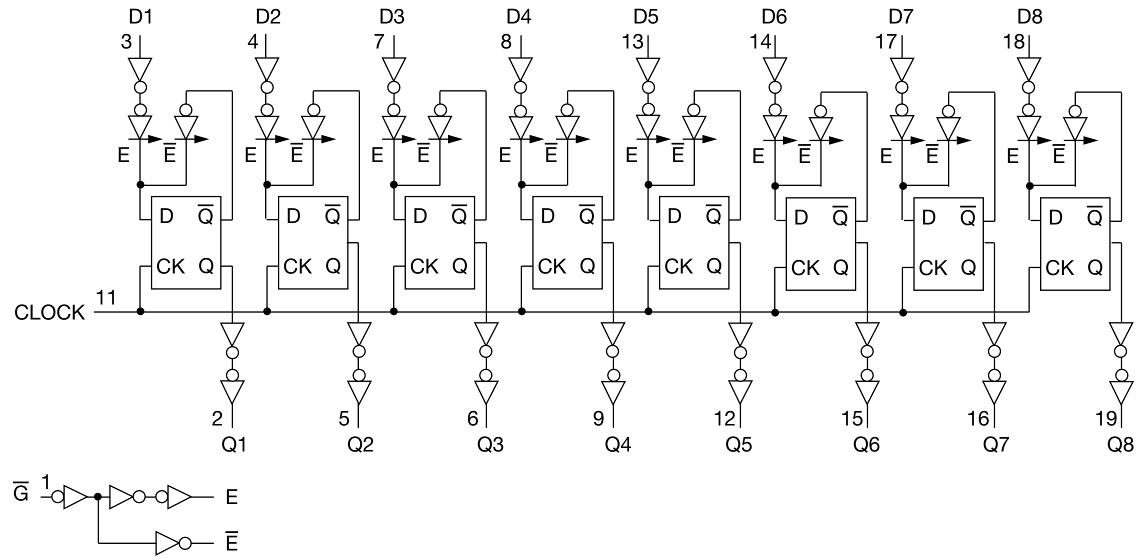
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0~5.5	V
Input Voltage	V_{IN}	0~V_{CC}	V
Output Voltage	V_{OUT}	0~V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C
Input Rise and Fall Time	dt/dv	0~100 (V_{CC} = 3.3±0.3V) 0~20 (V_{CC} = 5±0.5V)	ns/v

DC Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITION		V_{CC}	Ta = 25°C Min.	Ta = 25°C Typ.	Ta = 25°C Max.	Ta = -40~85°C Min.	Ta = -40~85°C Max.	UNIT
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} = -50μA	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} = -4mA	3.0	2.58	—	—	2.48	—	
			I_{OH} = -24mA	4.5	3.94	—	—	3.80	—	
			I_{OH} = -75mA*	5.5	—	—	—	3.85	—	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50μA	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} =12mA	3.0	—	—	0.36	—	0.44	
			I_{OL} = 24mA	4.5	—	—	0.36	—	0.44	
			I_{OL} = 75mA*	5.5	—	—	—	—	1.65	
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} or GND		5.5	—	—	±0.1	—	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	—	—	8.0	—	80.0	

* 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	V_{CC}	Ta=25°C Typ.	Ta=25°C Max.	Ta= –40~85° Max.	UNIT
Minimum Pulse Width (CK)	$t_{W(L)}$ $t_{W(H)}$	—	3.3±0.3	—	8.0	8.0	ns
			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 ($\overline{G}$–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	V_{CC}	Ta = 25°C Min.	Ta = 25°C Typ.	Ta = 25°C Max.	Ta = -40~85°C Min.	Ta = -40~85°C Max.	UNIT
Propagation Delay Time (CK–Q)	t_{pLH} t_{pHL}	—	3.0±0.3	—	10.6	17.6	1.0	20.0	ns
			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: $I_{CC (opr)} = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC} / 8$ (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 • n.