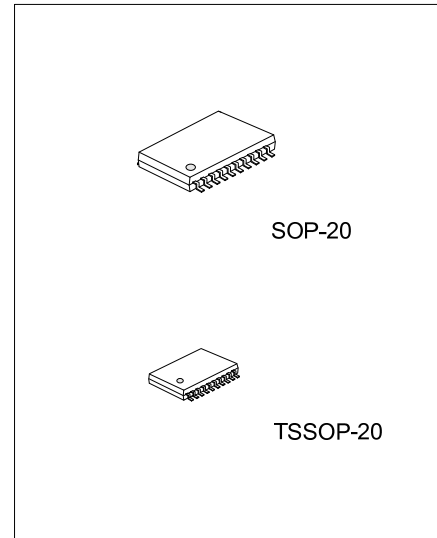




U74AHC377

CMOS IC

OCTAL D-TYPE FLIP-FLOPS WITH DATA ENABLE POSITIVE-EDGE TRIGGER



DESCRIPTION

The **U74AHC377** is a high-speed Si-gate CMOS device and is compatible with low-power Schottky TTL (LSTTL).

The **U74AHC377** has eight edge-triggered, D-type flip-flops with individual D inputs and Q outputs. A common clock input (CLK) loads all flip-flops simultaneously when the data enable input (\overline{EN}) is LOW. The state of each D input, one set-up time before the LOW-to-HIGH clock transition, is transferred to the corresponding output (Qn) of the flip-flop. The \overline{EN} input is only required to be stable one set-up time prior to the LOW-to-HIGH transition for predictable operation.

FEATURES

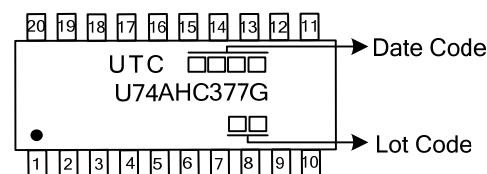
- * Balanced propagation delays
- * All inputs have Schmitt-trigger actions
- * Inputs accept voltages higher than V_{CC}
- * Ideal for addressable register applications
- * Data enable for address and data synchronization
- * Eight positive-edge triggered D-type flip-flops

ORDERING INFORMATION

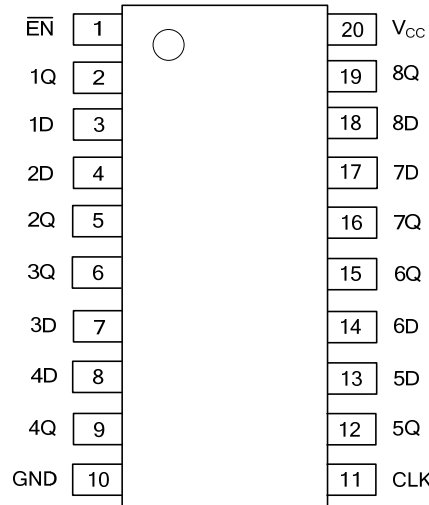
Ordering Number	Package	Packing
U74AHC377G-R20-T	SSOP-20	Tube
U74AHC377G-P20-R	TSSOP-20	Tape Reel

<p>U74AHC377G-S20-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) R20: SSOP-20, P20: TSSOP-20 (3) G: Halogen Free and Lead Free</p>
--	---

MARKING



■ PIN CONFIGURATION



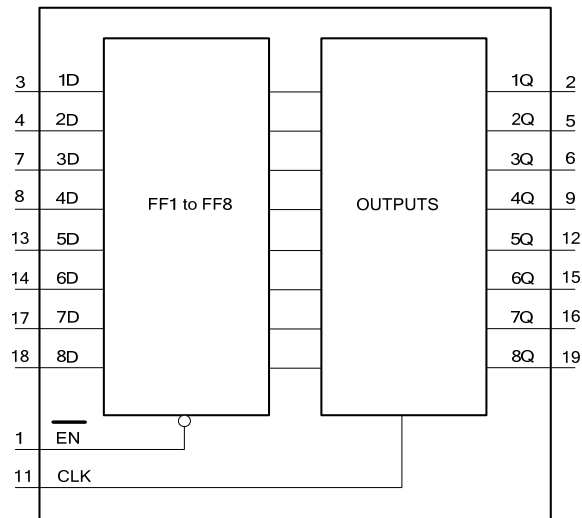
■ PIN DESCRIPTION

SYMBOL	PIN	DESCRIPTION
$\overline{\text{EN}}$	1	Data Enable Input (Active low)
1Q	2	Flip-flop Output
1D	3	Data Input
2D	4	Data Input
2Q	5	Flip-flop Output
3Q	6	Flip-flop Output
3D	7	Data Input
4D	8	Data Input
4Q	9	Flip-flop Output
GND	10	Ground (0V)
CLK	11	Clock Input (Low-to-High, Edge Triggered)
5Q	12	Flip-flop Output
5D	13	Data Input
6D	14	Data Input
6Q	15	Flip-Flop Output
7D	16	Flip-Flop Output
7Q	17	Data Input
8D	18	Data Input
8Q	19	Flip-Flop Output
V _{CC}	20	Supply Voltage

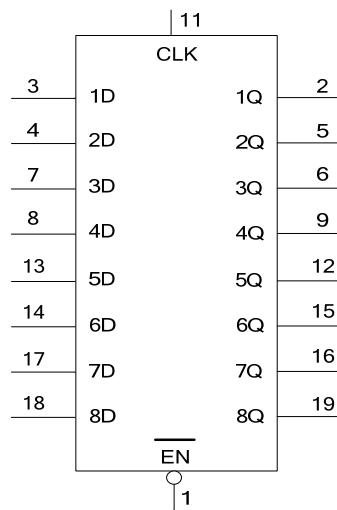
■ FUNCTION TABLE

INPUTS			OUTPUT Q
$\overline{\text{EN}}$	CLK	D	
H	X	X	Q ₀
L	↑	H	H
L	↑	L	L
X	L	X	Q ₀

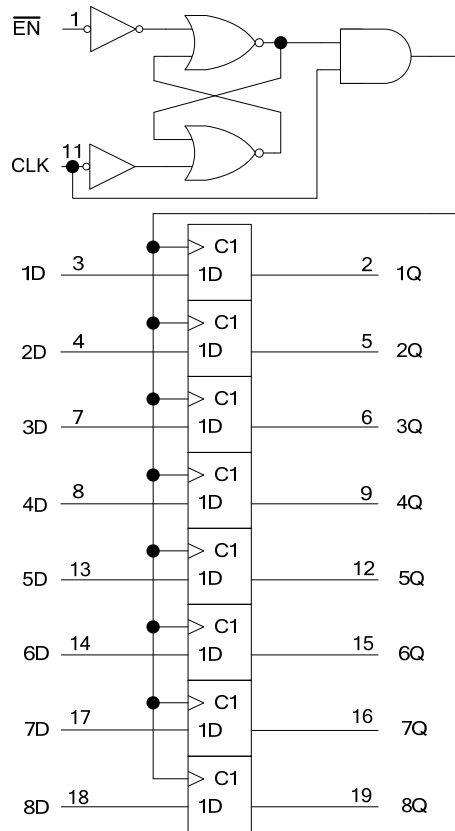
■ FUNCTIONAL DIAGRAM



■ LOGIC SYMBOL



■ LOGIC DIAGRAM (POSITIVE LOGIC)



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		-0.5		7	V
Input Voltage	V_I		-0.5		7	V
V_{CC} or GND Current	I_{CC}		-75		+75	mA
Output Current	I_{OUT}	$V_O = -0.5V$ to $(V_{CC} + 0.5V)$	-25		+25	mA
Input Clamp Current	I_{IK}	$V_I < -0.5V$	-20			mA
Output Clamp Current	I_{OK}	$V_O < -0.5V$ or $V_O > V_{CC} + 0.5V$	-20		+20	mA
Storage Temperature	T_{STG}		-65		+150	°C

Note: The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2	5	5.5	V
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise and Fall Rate	$\Delta t/\Delta v$	$V_{CC} = 3V \sim 3.6V$			100	ns/V
		$V_{CC} = 4.5V \sim 5.5V$			20	
Ambient Temperature	T_A		-40	+25	+85	°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-20	θ_{JA}	58	°C/W
	TSSOP-20		83	

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-level Input Voltage	V_{IH}	$V_{CC} = 2V$	1.5			V
		$V_{CC} = 3V$	2.1			
		$V_{CC} = 5.5V$	3.85			
Low-level Input Voltage	V_{IL}	$V_{CC} = 2V$			0.5	V
		$V_{CC} = 3V$			0.9	
		$V_{CC} = 5.5V$			1.65	
Output Voltage High-Level	V_{OH}	$V_{CC} = 2V, I_{OH} = -50\mu A$	1.9	2		V
		$V_{CC} = 3V, I_{OH} = -50\mu A$	2.9	3		
		$V_{CC} = 4.5V, I_{OH} = -50\mu A$	4.4	4.5		
		$V_{CC} = 3V, I_{OH} = -4mA$	2.58			
		$V_{CC} = 4.5V, I_{OH} = -8mA$	3.94			
Output Voltage Low-Level	V_{OL}	$V_{CC} = 2V, I_{OH} = 50\mu A$		0	0.1	V
		$V_{CC} = 3V, I_{OH} = 50\mu A$		0	0.1	
		$V_{CC} = 4.5V, I_{OH} = 50\mu A$		0	0.1	
		$V_{CC} = 3V, I_{OH} = 4mA$			0.36	
		$V_{CC} = 4.5V, I_{OH} = 8mA$			0.36	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC} = 0V$ to $5.5V, V_{IN} = 5.5V$ or GND			0.1	μA
Quiescent Supply Current	I_{CC}	$V_{CC} = 5.5V, V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$			4	μA
Input Capacitance	C_I	$V_I = V_{CC}$ or GND		3	10	pF

■ DYNAMIC CHARACTERISTICS ($t_r = t_f \leq 3\text{ns}$, ground=0V, $T_A = 25^\circ\text{C}$, unless otherwise specified)

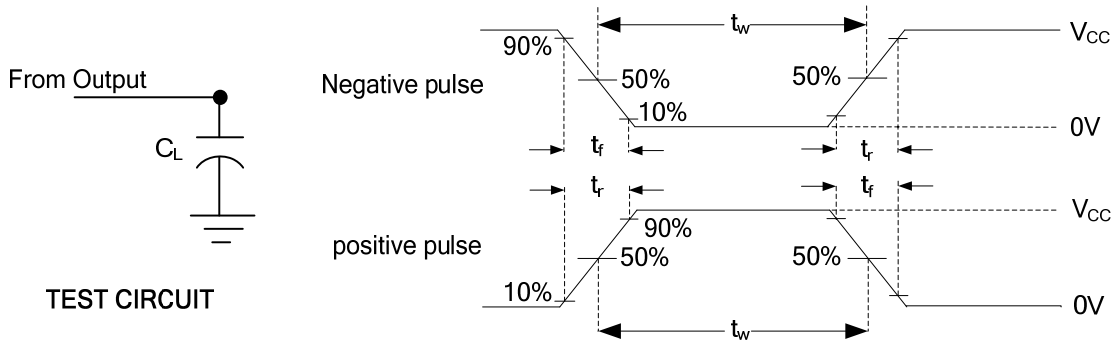
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
maximum frequency	f_{MAX}	$V_{\text{CC}}=3\text{V to } 3.6\text{V}, C_L=15\text{pF}$	80	125		ns
		$V_{\text{CC}}=3\text{V to } 3.6\text{V}, C_L=50\text{pF}$	50	75		
		$V_{\text{CC}}=4.5\text{V to } 5.5\text{V}, C_L=15\text{pF}$	125	175		
		$V_{\text{CC}}=4.5\text{V to } 5.5\text{V}, C_L=50\text{pF}$	85	120		
propagation delay, From CP to Qn	t_{PD}	$V_{\text{CC}}=3\text{V to } 3.6\text{V}, C_L=15\text{pF}$		5.6	12.8	ns
		$V_{\text{CC}}=3\text{V to } 3.6\text{V}, C_L=50\text{pF}$		8	16	
		$V_{\text{CC}}=4.5\text{V to } 5.5\text{V}, C_L=15\text{pF}$		3.9	9	
		$V_{\text{CC}}=4.5\text{V to } 5.5\text{V}, C_L=50\text{pF}$		5.6	10.5	
pulse width CP, From HIGH or LOW	t_w	$V_{\text{CC}}=3\text{V to } 3.6\text{V}$	5			ns
		$V_{\text{CC}}=4.5\text{V to } 5.5\text{V}$	5			
set-up time Dn, From $\overline{\text{EN}}$ to CP	t_{SU}	$V_{\text{CC}}=3\text{V to } 3.6\text{V}$	5			ns
		$V_{\text{CC}}=4.5\text{V to } 5.5\text{V}$	4.5			
hold time Dn, From $\overline{\text{EN}}$ to CP	t_{H}	$V_{\text{CC}}=3\text{V to } 3.6\text{V}$	1.5			ns
		$V_{\text{CC}}=4.5\text{V to } 5.5\text{V}$	2			

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

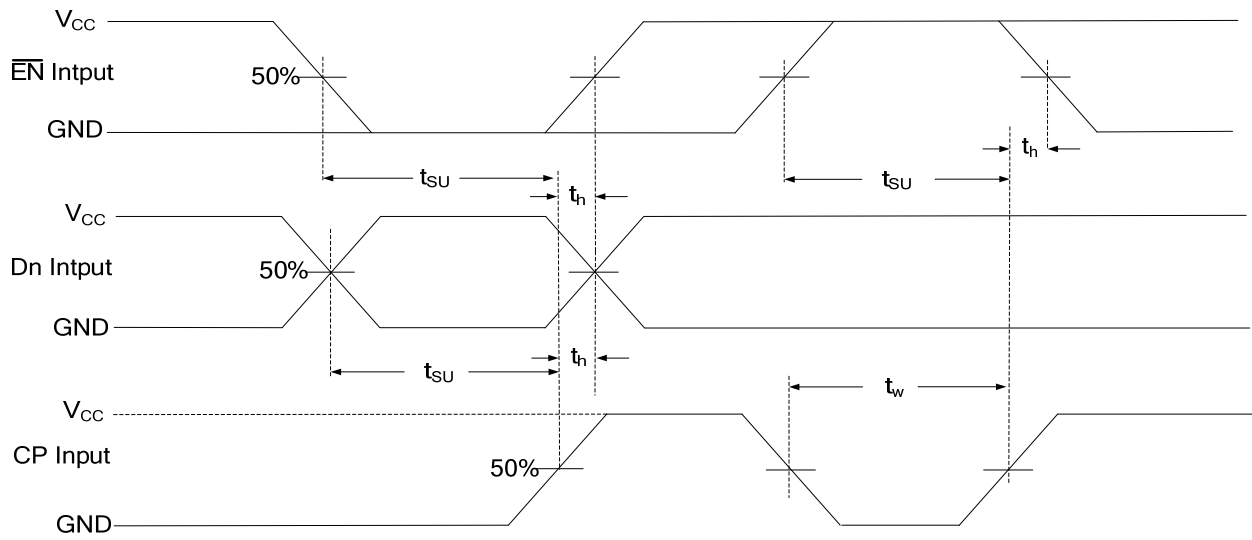
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	$f=1\text{MHz}; V_I=\text{GND to } V_{\text{CC}}$		20		pF

Note: t_{PLH} and t_{PHL} are the same as t_{PD} .

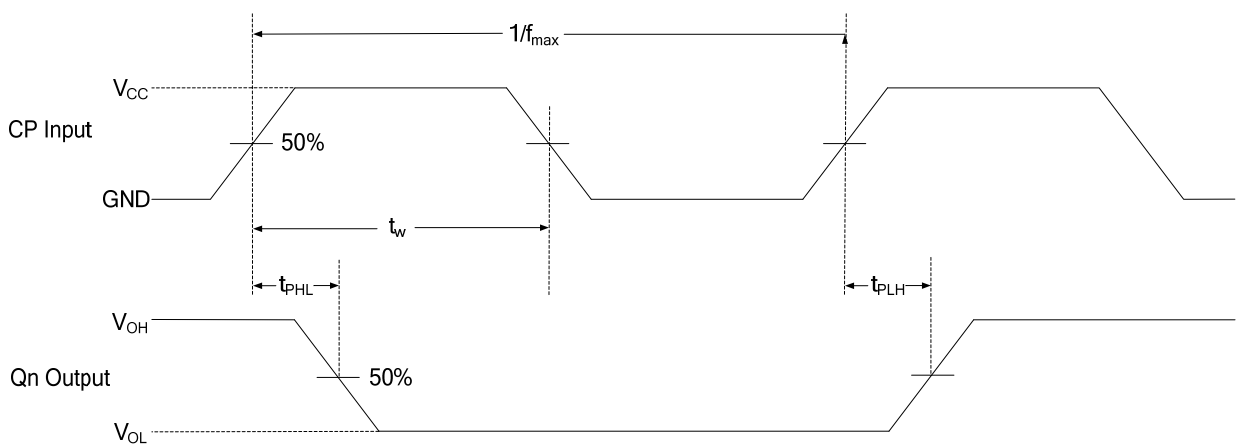
TEST CIRCUIT AND WAVEFORMS



LOAD CIRCUITRY FOR MEASURING SWITCHING TIMES



DATA SET-UP AND HOLD TIMES



CLOCK PULSE WIDTH, MAXIMUM FREQUENCY AND INPUT TO OUTPUT PROPAGATION DELAYS

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. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.