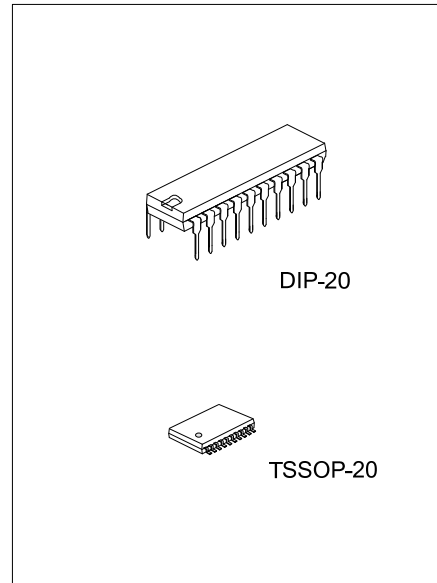




## U74AHCT374

CMOS IC

### OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS



#### DESCRIPTION

The **U74AHCT374** is a octal edge-triggered D-type flip-flops with 3-state outputs and 8 channels.

When the  $\overline{OE}$  input is low, on the positive transition of the clock (CLK) input, the Q outputs are set to the logic levels of the data (D) inputs.

When the  $\overline{OE}$  input is high, the outputs are in the high-impedance.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pull-up resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

#### FEATURES

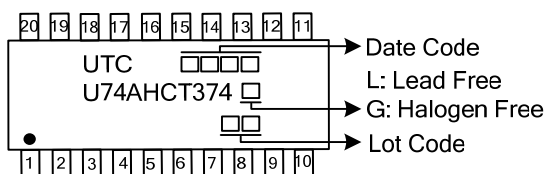
- \* Inputs are TTL-Voltage Compatible
- \* Operate from 4.5V to 5.5V
- \* Inputs Accept Voltages to 5.5V
- \* Max  $t_{PD}$  of 9.4ns at  $V_{CC}=5V$ ,  $C_L=15pF$
- \* Typical  $V_{OL} < 0.36V$  at  $V_{CC}=4.5V$ ,  $I_{OL}=8mA$ ,  $T_A=25^\circ C$
- \* Typical  $V_{OH} > 3.94V$  at  $V_{CC}=4.5V$ ,  $I_{OH}=-8mA$ ,  $T_A=25^\circ C$

#### ORDERING INFORMATION

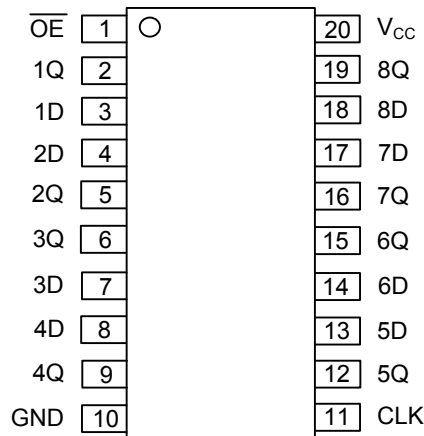
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AHCT374L-D20-T	U74AHCT374G-D20-T	DIP-20	Tube
U74AHCT374L-P20-R	U74AHCT374G-P20-R	TSSOP-20	Tape Reel

<p>U74AHCT374G-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, P20: TSSOP-20 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



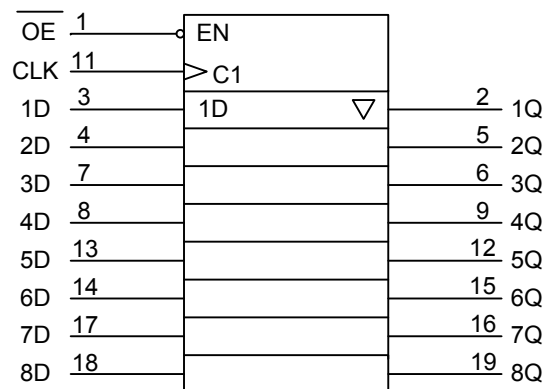
■ PIN CONFIGURATION



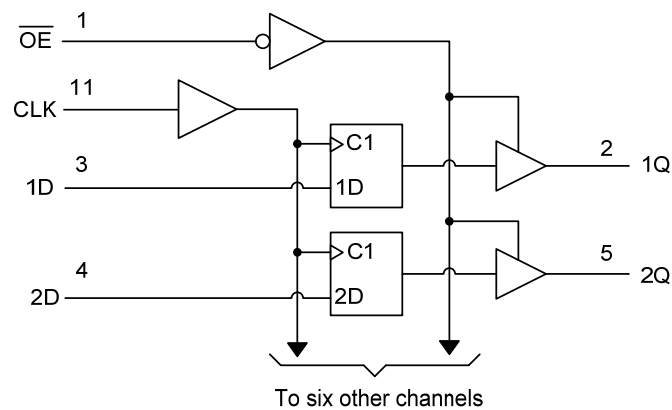
■ FUNCTION TABLE

INPUTS( $\overline{OE}$ )	INPUTS(CLK)	INPUTS(D)	OUTPUT(Q)
L	$\uparrow$	H	H
L	$\uparrow$	L	L
L	H or L	X	$Q_0$
H	X	X	Z

■ LOGIC SYMBOL



■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5 ~ 7	V
Input Voltage	$V_{IN}$	-0.5 ~ 7	V
Output Voltage	$V_{OUT}$	-0.5 ~ $V_{CC} + 0.5$	V
$V_{CC}$ or GND Current	$I_{CC}$	±75	mA
Output Current	$I_{OUT}$	±25	mA
Input Clamp Current	$I_{IK}$	-20	mA
Output Clamp Current	$I_{OK}$	±20	mA
Storage Temperature	$T_{STG}$	-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 CONDITIONS (Unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$	4.5		5.5	V
High-level Input Voltage	$V_{IH}$	2			V
Low-level Input Voltage	$V_{IL}$			0.8	V
Input Voltage	$V_{IN}$	0		5.5	V
Output Voltage	$V_{OUT}$	0		$V_{CC}$	V
High-Level Output Current	$I_{OH}$			-8	mA
Low-Level Output Current	$I_{OL}$			8	mA
Input Rise or Fall Times	$\Delta t/\Delta V$			20	ns/V
Operating free-Air Temperature	$T_A$	-40		+125	°C

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage High-Level	$V_{OH}$	$V_{CC}=4.5V, I_{OH}=-50\mu A$	4.4	4.5		V
		$V_{CC}=4.5V, I_{OH}=-8mA$	3.94			V
Output Voltage Low-Level	$V_{OL}$	$V_{CC}=4.5V, I_{OL}=50\mu A$			0.1	V
		$V_{CC}=4.5V, I_{OL}=8mA$			0.36	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0V$ to 5.5V, $V_{IN}=0$ or 5.5V			±0.1	μA
Leakage Current (For Output in High-Impedance State)	$I_{OZ}$	$V_{CC}=5.5V, V_{IN}=V_{IH}$ or $V_{IH}, V_{OUT}=0$ or 5.5V			±0.25	μA
Quiescent Supply Current	$I_{CC}$	$V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			4	μA
Additional Quiescent Supply Current	$\Delta I_{CC}$	$V_{CC}=5.5V$ , one input at 3.4V, Other inputs at $V_{CC}$ or GND			1.35	mA
Input Capacitance	$C_I$	$V_{CC}=5V, V_{IN}=V_{CC}$ or GND		4	10	pF
Output Capacitance	$C_O$	$V_{CC}=5V, V_{OUT}=V_{CC}$ or GND		9		pF

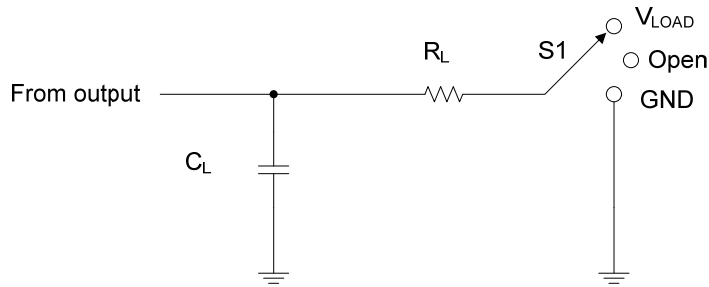
■ SWITCHING CHARACTERISTICS (See TEST CIRCUIT AND WAVEFORMS)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Propagation Delay from Input (CLK) to Output (Q)	$t_{PLH}/t_{PHL}$	$V_{CC}=5V\pm 0.5V$	$C_L=15pF$		5.6	9.4	ns
			$C_L=50pF$		6.4	10.4	ns
Propagation Delay from Input ( $\overline{OE}$ ) to Output (Q)	$t_{PZL}/t_{PZH}$	$V_{CC}=5V\pm 0.5V$	$C_L=15pF$		6.5	10.2	ns
			$C_L=50pF$		7.3	11.2	ns
Propagation Delay from Input ( $\overline{OE}$ ) to Output (Q)	$t_{PLZ}/t_{PHZ}$	$V_{CC}=5V\pm 0.5V$	$C_L=15pF$		6.2	10.2	ns
			$C_L=50pF$		7	11.2	ns
Maximum Clock Frequency	$f_{MAX}$	$V_{CC}=5V\pm 0.5V$	$C_L=15pF$		90	140	MHz
			$C_L=50pF$		85	130	MHz
Pulse Width	$t_W$	$V_{CC}=5V\pm 0.5V$		6.5		ns	
Setup Time	$t_{SU}$	$V_{CC}=5V\pm 0.5V$		2.5		ns	
Hold Time	$t_H$	$V_{CC}=5V\pm 0.5V$		2.5		ns	

■ OPERATING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	No load, $V_{CC}=5V$ , $f=1MHz$		27		pF

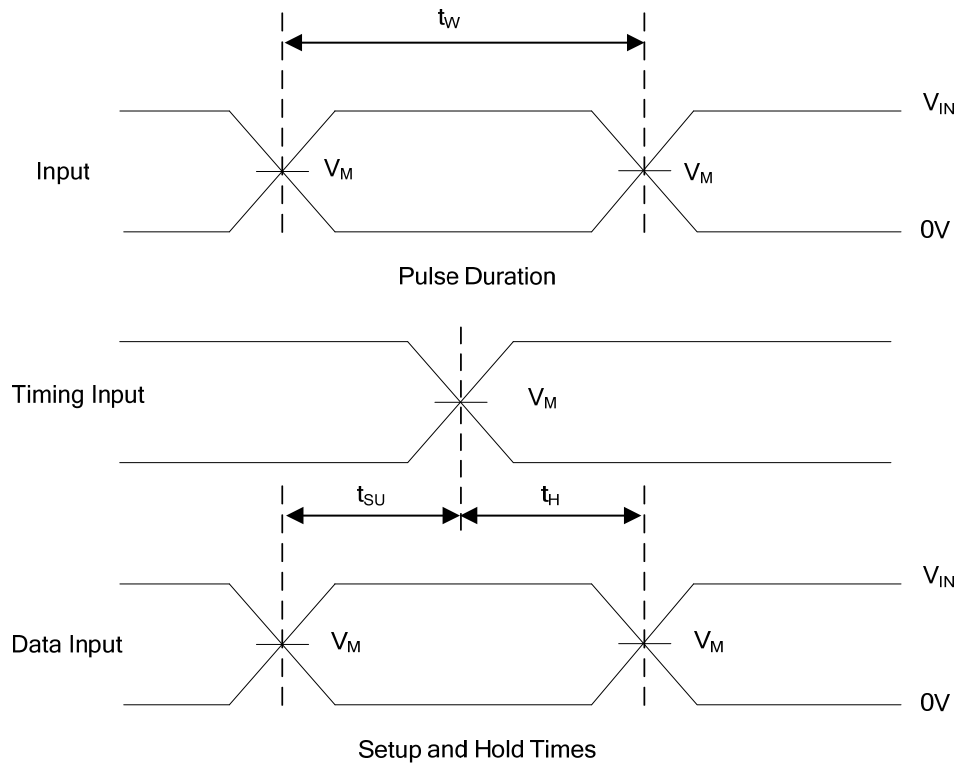
■ TEST CIRCUIT AND WAVEFORMS



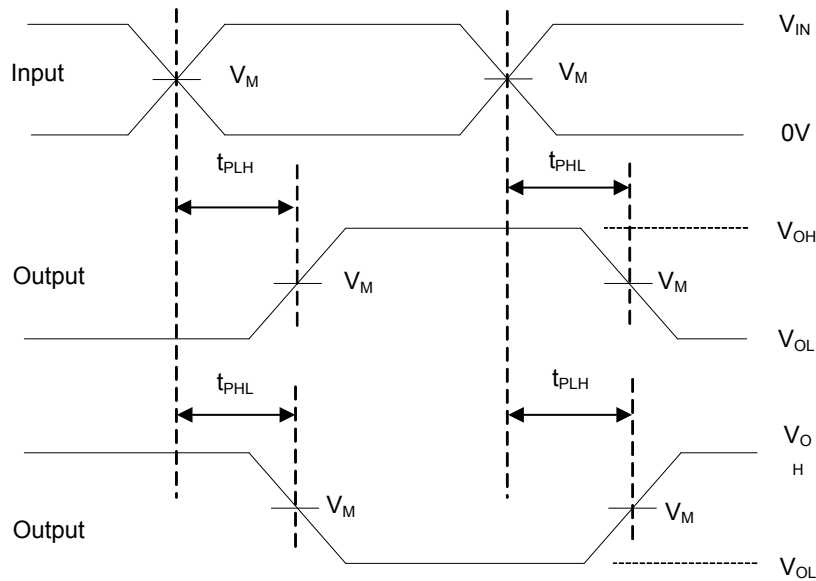
TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	$V_{LOAD}$
$t_{PHZ}/t_{PZH}$	GND

Test Circuit

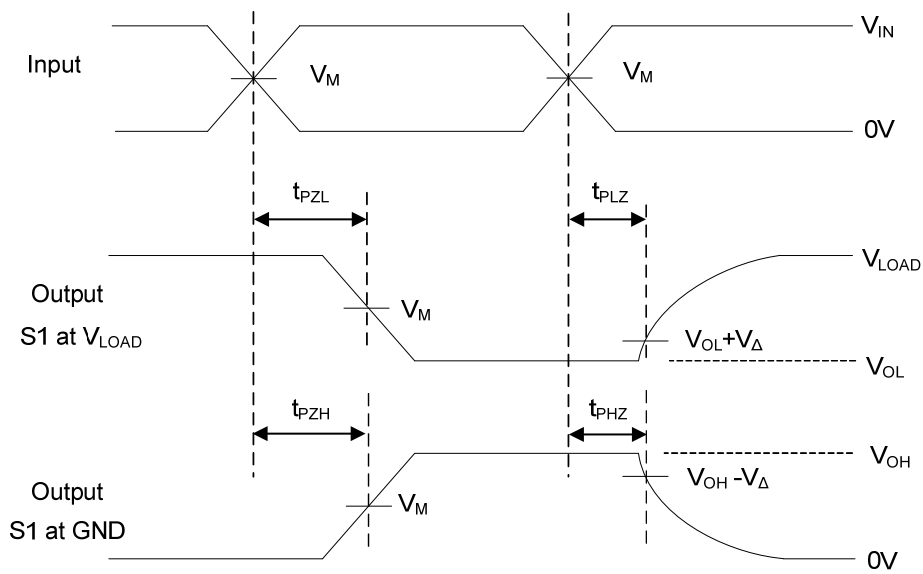
$V_{CC}$	Input		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_{IN}$	$t_R, t_F$					
$5V \pm 0.5V$	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$V_{CC}$	15pF	$1k\Omega$	0.5V
					50pF		



## ■ TEST CIRCUIT AND WAVEFORMS (Cont.)



Voltage Waveforms Propagation Delay Times



Voltage Waveforms Enable and Disable Times

Note: A. C<sub>L</sub> includes probe and jig capacitance.

B. P<sub>RR</sub> ≤ 1MHz, Z<sub>O</sub> = 50Ω, t<sub>R</sub> ≤ 3ns, t<sub>F</sub> ≤ 3ns.

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