



## U74HC374

CMOS IC

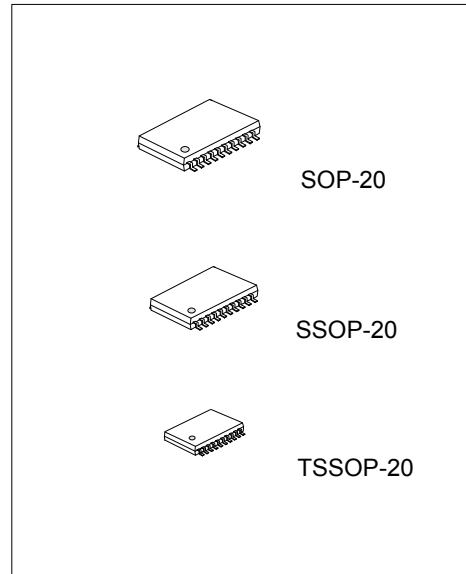
### OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS

#### DESCRIPTION

The UTC **U74HC374** is an octal edge-triggered D-type flip-flop with 3-state outputs and 8 channels.

#### FEATURES

- \* Operate from 2V to 6V
- \* Max  $t_{PD}$  of 46ns at 4.5 V,  $T_A = 25^\circ C$
- \* Max  $I_{CC}$  of 8 $\mu A$ ,  $T_A = 25^\circ C$
- \* Typical  $V_{OL} < 0.17V$  at  $V_{CC} = 4.5V$ ,  $I_{OUT} = -6mA$ ,  $T_A = 25^\circ C$
- \* Typical  $V_{OH} > 4.3V$  at  $V_{CC} = 4.5V$ ,  $I_{OUT} = 6mA$ ,  $T_A = 25^\circ C$

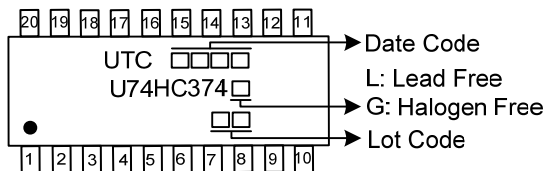


#### ORDERING INFORMATION

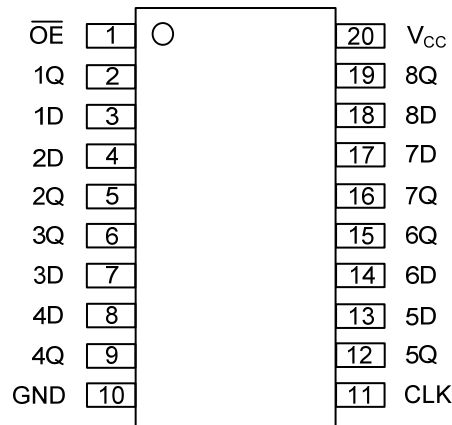
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC374L-S20-R	U74HC374G-S20-R	SOP-20	Tape Reel
U74HC374L-R20-R	U74HC374G-R20-R	SSOP-20	Tape Reel
U74HC374L-P20-R	U74HC374G-P20-R	TSSOP-20	Tape Reel

<p>U74HC374G-S20-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) P20: TSSOP-20, R20: SSOP-20, S20: SOP-20 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



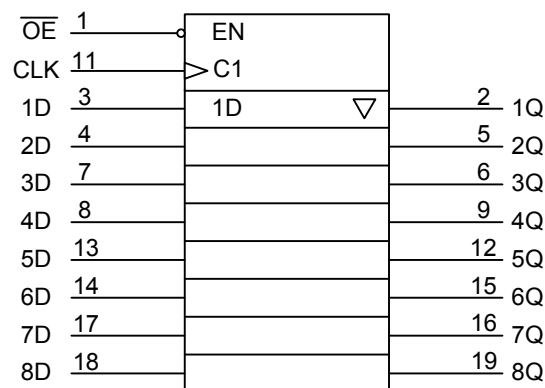
## PIN CONFIGURATION



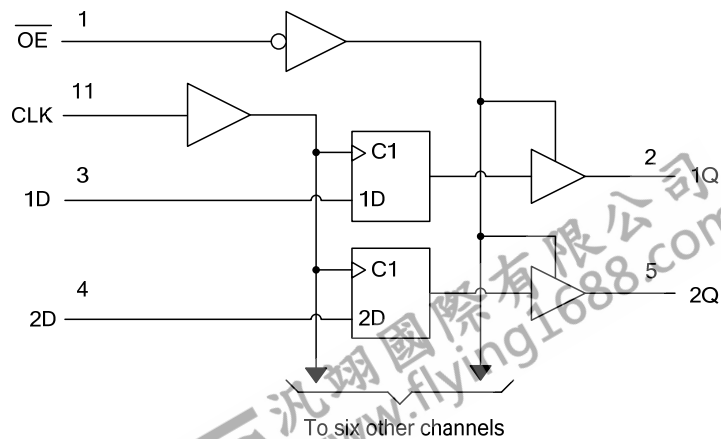
## FUNCTION TABLE

INPUTS( $\overline{OE}$ )	INPUTS(CLK)	INPUTS(D)	OUTPUT(Q)
L	$\uparrow$	H	H
L	$\uparrow$	L	L
L	L/H	X	Q0
H	X	X	Z

## LOGIC SYMBOL



## LOGIC DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5 ~ +7	V
$V_{CC}$ or GND Current	$I_{CC}$	±70	mA
Output Current	$I_{OUT}$	±35	mA
Input Clamp Current	$I_{IK}$	±20	mA
Output Clamp Current	$I_{OK}$	±20	mA
Operating Temperature	$T_{OPR}$	-40 ~ + 85	°C
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.

## ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-20	58	°C /W
	SSOP-20	75	
	TSSOP-20	83	

## ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$		2	5	6	V
High-Level Input Voltage	$V_{IH}$	$V_{CC}=2V$	1.5			V
		$V_{CC}=4.5V$	3.15			V
		$V_{CC}=6V$	4.2			V
Low-Level Input Voltage	$V_{IL}$	$V_{CC}=2V$			0.5	V
		$V_{CC}=4.5V$			1.35	V
		$V_{CC}=6V$			1.8	V
Input Voltage	$V_{IN}$		0		$V_{CC}$	V
Output Voltage	$V_{OUT}$	High or low state	0		$V_{CC}$	V
Input Rise or Fall Times	$t_R, t_F$	$V_{CC}=2V$	0		1000	ns
		$V_{CC}=4.5V$	0		500	ns
		$V_{CC}=6V$	0		400	ns

## ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage High-Level	$V_{OH}$	$V_{CC}=2V, I_{OH}=-20\mu A$	1.9	1.999		V
		$V_{CC}=4.5V, I_{OH}=-20\mu A$	4.4	4.499		V
		$V_{CC}=6V, I_{OH}=-20\mu A$	5.9	5.999		V
		$V_{CC}=4.5V, I_{OH}=-6mA$	3.98	4.3		V
		$V_{CC}=6V, I_{OH}=-7.8mA$	5.48	5.8		V
Output Voltage Low-Level	$V_{OL}$	$V_{CC}=2V, I_{OL}=20\mu A$		0.002	0.1	V
		$V_{CC}=4.5V, I_{OL}=20\mu A$		0.001	0.1	V
		$V_{CC}=6V, I_{OL}=20\mu A$		0.001	0.1	V
		$V_{CC}=4.5V, I_{OL}=6mA$		0.17	0.26	V
		$V_{CC}=6V, I_{OL}=7.8mA$		0.15	0.26	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND		±0.1	±100	nA
3-State Leakage Current	$I_{OZ}$	$V_{CC}=6V, V_{OUT}=V_{CC}$ or GND		±0.01	±0.5	µA
Quiescent Supply Current	$I_{CC}$	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			8	µA
Input Capacitance	$C_I$	$V_{CC}=2V \sim 6V$		3	10	pF

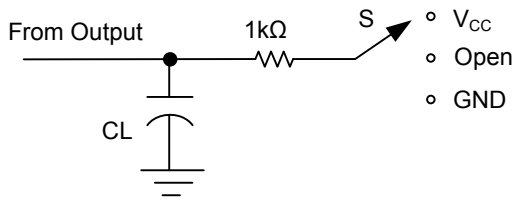
■ SWITCHING CHARACTERISTICS (See TEST CIRCUIT AND WAVEFORMS)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
From CLK to Q	$t_{PLH}/t_{PHL}$	$C_L = 50\text{pF}$	$V_{CC}=2\text{V}$		63	180	ns
			$V_{CC}=4.5\text{V}$		17	36	ns
			$V_{CC}=6\text{V}$		15	31	ns
		$C_L = 150\text{ pF}$	$V_{CC}=2\text{V}$		80	230	ns
			$V_{CC}=4.5\text{V}$		22	46	ns
			$V_{CC}=6\text{V}$		19	39	ns
From $\overline{\text{OE}}$ to Q	$t_{PZL}/t_{PZH}$	$C_L = 50\text{pF}$	$V_{CC}=2\text{V}$		60	150	ns
			$V_{CC}=4.5\text{V}$		16	30	ns
			$V_{CC}=6\text{V}$		14	26	ns
		$C_L = 150\text{ pF}$	$V_{CC}=2\text{V}$		70	200	ns
			$V_{CC}=4.5\text{V}$		25	40	ns
			$V_{CC}=6\text{V}$		22	34	ns
From $\overline{\text{OE}}$ to Q	$t_{PLZ}/t_{PHZ}$	$C_L = 50\text{pF}$	$V_{CC}=2\text{V}$		36	150	ns
			$V_{CC}=4.5\text{V}$		17	30	ns
			$V_{CC}=6\text{V}$		16	26	ns
Any Q	$t_T$	$C_L = 50\text{pF}$	$V_{CC}=2\text{V}$		28	60	ns
			$V_{CC}=4.5\text{V}$		8	12	ns
			$V_{CC}=6\text{V}$		6	10	ns
		$C_L = 150\text{ pF}$	$V_{CC}=2\text{V}$		45	210	ns
			$V_{CC}=4.5\text{V}$		17	42	ns
			$V_{CC}=6\text{V}$		13	36	ns
Maximum Clock Frequency	$f_{MAX}$	$C_L = 50\text{pF}$	$V_{CC}=2\text{V}$	6	12		MHz
			$V_{CC}=4.5\text{V}$	30	60		MHz
			$V_{CC}=6\text{V}$	35	70		MHz
		$C_L = 150\text{pF}$	$V_{CC}=2\text{V}$	6	12		MHz
			$V_{CC}=4.5\text{V}$	30	60		MHz
			$V_{CC}=6\text{V}$	35	70		MHz
Clock Frequency	$f_{CLOCK}$	$V_{CC}=2\text{V}$			6	MHz	
		$V_{CC}=4.5\text{V}$			30	MHz	
		$V_{CC}=6\text{V}$			35	MHz	
Pulse Width	$t_W$	$V_{CC}=2\text{V}$	80			ns	
		$V_{CC}=4.5\text{V}$	16			ns	
		$V_{CC}=6\text{V}$	14			ns	
Setup Time	$t_{SU}$	$V_{CC}=2\text{V}$	100			ns	
		$V_{CC}=4.5\text{V}$	20			ns	
		$V_{CC}=6\text{V}$	17			ns	
Hold Time	$t_H$	$V_{CC}=2\text{V}$	10			ns	
		$V_{CC}=4.5\text{V}$	5			ns	
		$V_{CC}=6\text{V}$	5			ns	

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

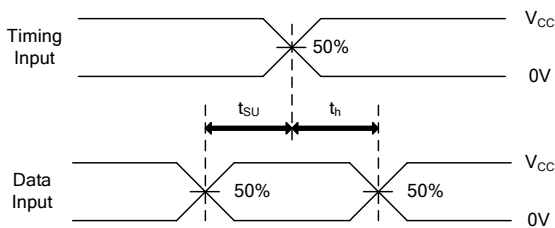
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	No load		100		pF

## TEST CIRCUIT AND WAVEFORMS

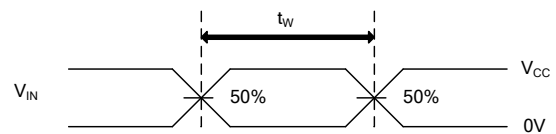


TEST CIRCUIT

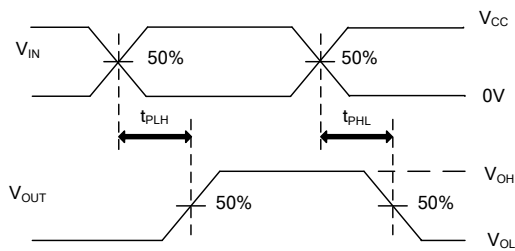
TEST	S
$t_{PLH}/t_{PHL}$	Open
$t_{PHZ}/t_{PZH}$	GND
$t_{PLZ}/t_{PZL}$	$V_{CC}$



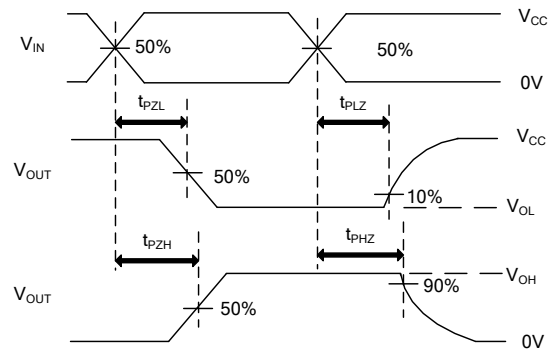
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Note: CL includes probe and jig capacitance.  
 PRR ≤ 1MHz,  $Z_O = 50\Omega$ ,  $t_R \leq 6ns$ ,  $t_F \leq 6ns$ .

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