



## U74AHC574

CMOS IC

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

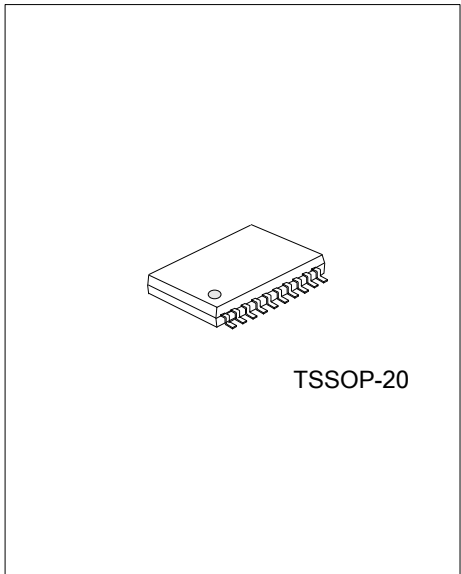
#### DESCRIPTION

The **U74AHC574** is a octal edge-triggered D-type flip-flops with 3-state outputs, and it has 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.



TSSOP-20

#### FEATURES

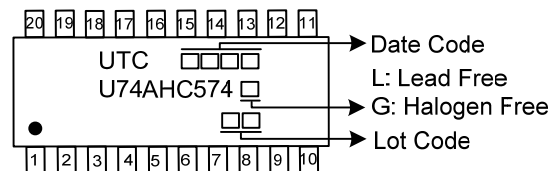
- \* Operate from 2V to 5.5V
- \* Max  $t_{pd}$  of 13.2 ns at at  $V_{CC}=3.3V$ ,  $C_L=15pF$
- \* Max  $I_{CC}$  of 4uA
- \* Typical  $V_{OL} < 0.36V$  at  $V_{CC}=4.5V$ ,  $I_O=8mA$ ,  $T_A=25^\circ C$
- \* Typical  $V_{OH} > 3.94V$  at  $V_{CC}=4.5V$ ,  $I_O=-8mA$ ,  $T_A=25^\circ C$

#### ORDERING INFORMATION

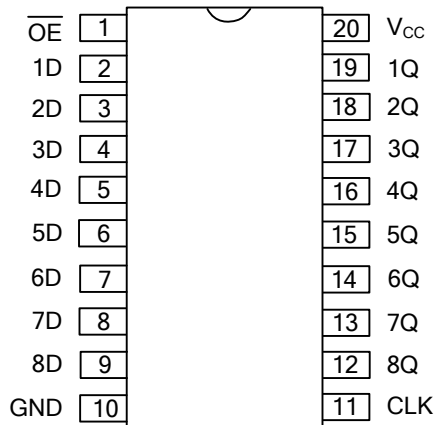
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AHC574L-P20-R	U74AHC574G-P20-R	TSSOP-20	Tape Reel

<p>U74AHC574G-P20-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) P20: TSSOP-20</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



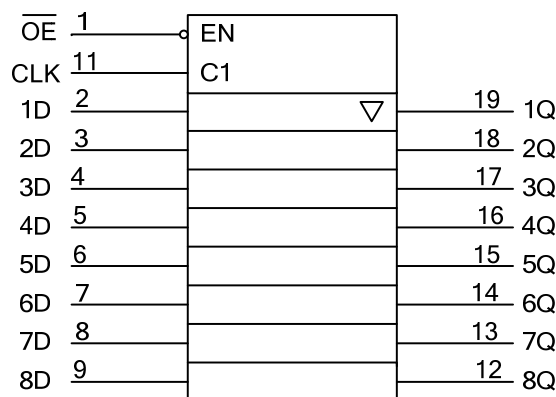
■ PIN CONFIGURATION



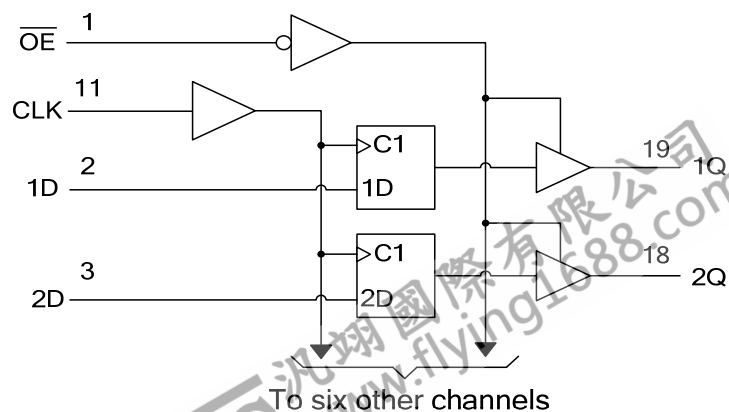
■ FUNCTION TABLE

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

■ LOGIC SYMBOL



■ LOGIC DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING

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
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.

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$		2		5.5	V
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	
Input Voltage	$V_{IN}$		0		$V_{CC}$	V
Output Voltage	$V_{OUT}$	High or low state	0		$V_{CC}$	V
High-level Output Current	$I_{OH}$	$V_{CC}=2V$			-50	μA mA
		$V_{CC}=3.3V \pm 0.3V$			-4	
		$V_{CC}=5V \pm 0.5V$			-8	
Low-level Output Current	$I_{OL}$	$V_{CC}=2V$			50	μA mA
		$V_{CC}=3.3V \pm 0.3V$			4	
		$V_{CC}=5V \pm 0.5V$			8	
Input Rise or Fall Times	$t_R, t_F$	$V_{CC}=3.3V \pm 0.3V$			100	ns
		$V_{CC}=5V \pm 0.5V$			20	

### ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
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	$V_{OL}$	$V_{CC}=2V, I_{OL}=50\mu A$			0.1	V
		$V_{CC}=3V, I_{OL}=50\mu A$			0.1	
		$V_{CC}=4.5V, I_{OL}=50\mu A$			0.1	
		$V_{CC}=3V, I_{OL}=4mA$			0.36	
		$V_{CC}=4.5V, I_{OL}=8mA$			0.36	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0 \sim 5.5V, V_{IN}=5.5V$ or GND			±0.1	μA
3-state Leakage Current	$I_{OZ}$	$V_{CC}=5.5V, V_{OUT}=V_{CC}$ or GND			±0.25	μA
Quiescent Supply Current	$I_{CC}$	$V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			4	μA
Input Capacitance	$C_I$	$V_{CC}=5V, V_{IN}=V_{CC}$ or GND		3	10	pF
Output Capacitance	$C_O$	$V_{CC}=5V, V_{OUT}=V_{CC}$ or GND		3		pF

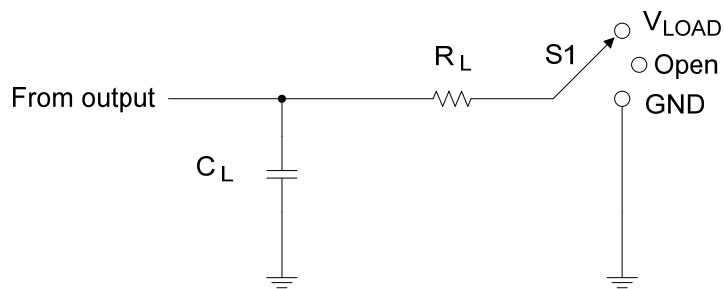
■ SWITCHING CHARACTERISTICS (See TEST CIRCUIT AND WAVEFORMS)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
From CLK to Q	$t_{PLH}/t_{PHL}$	$V_{CC}=3.3V\pm 0.3V$	$C_L=15pF$		8.5	13.2	ns
			$C_L=50pF$		11	16.7	
		$V_{CC}=5V\pm 0.5V$	$C_L=15pF$		5.6	8.6	
			$C_L=50pF$		7.1	10.6	
From $\overline{OE}$ to Q	$t_{PZL}/t_{PZH}$	$V_{CC}=3.3V\pm 0.3 V$	$C_L=15pF$		8.2	12.8	ns
			$C_L=50pF$		10.7	16.3	
		$V_{CC}=5V\pm 0.5V$	$C_L=15pF$		5.9	9	
			$C_L=50pF$		7.4	11	
From $\overline{OE}$ to Q	$t_{PLZ}/t_{PHZ}$	$V_{CC}=3.3V\pm 0.3V$	$C_L=15pF$		8.5	13	ns
			$C_L=50pF$		11	15	
		$V_{CC}=5V\pm 0.5V$	$C_L=15pF$		5.5	9	
			$C_L=50pF$		7.1	10.1	
Maximum Clock Frequency	$f_{MAX}$	$V_{CC}=3.3V\pm 0.3V$	$C_L=15pF$	80	125		MHz
			$C_L=50pF$	50	75		
		$V_{CC}=5V\pm 0.5V$	$C_L=15pF$	130	180		
			$C_L=50pF$	85	115		
Pulse Width	$t_W$	$V_{CC}=3.3V\pm 0.3V$		5			ns
		$V_{CC}=5V\pm 0.5V$		5			
Setup Time	$t_{SU}$	$V_{CC}=3.3V\pm 0.3V$		3.5			ns
		$V_{CC}=5V\pm 0.5V$		3			
Hold Time	$t_H$	$V_{CC}=3.3V\pm 0.3V$		1.5			ns
		$V_{CC}=5V\pm 0.5V$		1.5			

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	Cpd	No load, $V_{CC}=5V$ , $f=1MHz$		28		pF

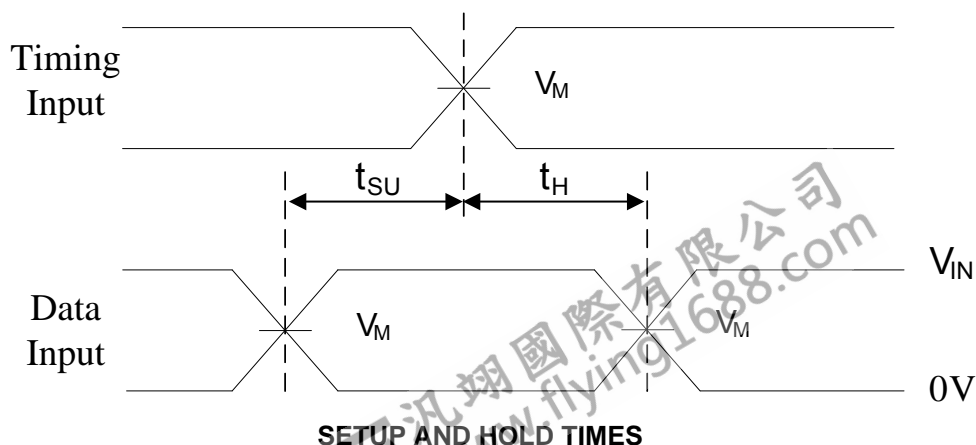
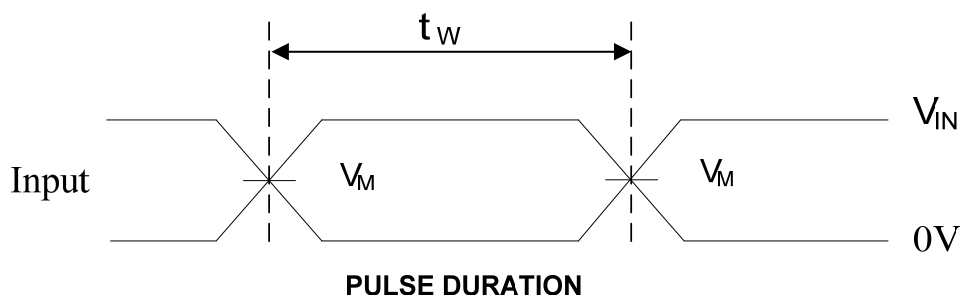
## ■ TEST CIRCUIT AND WAVEFORMS



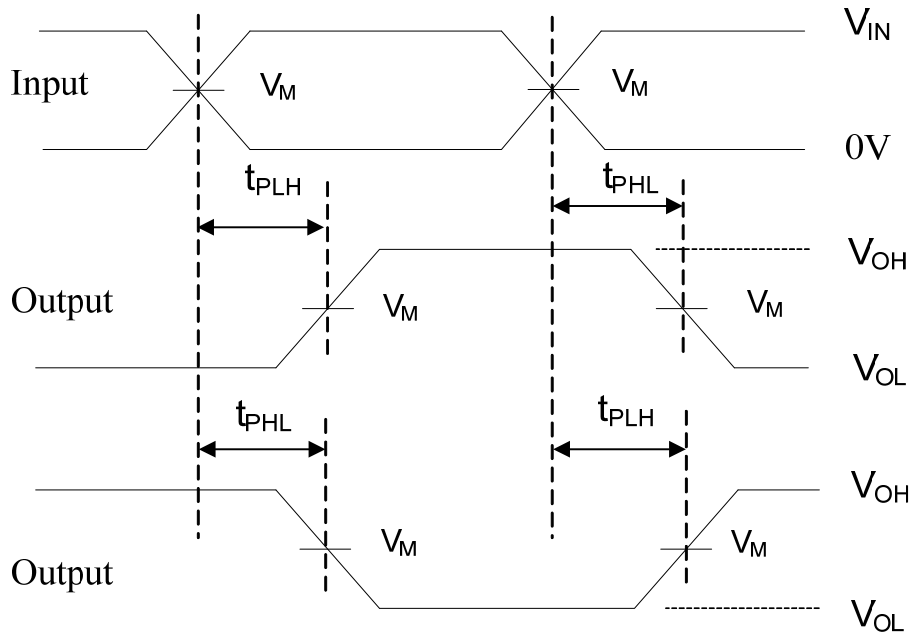
TEST CIRCUIT

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

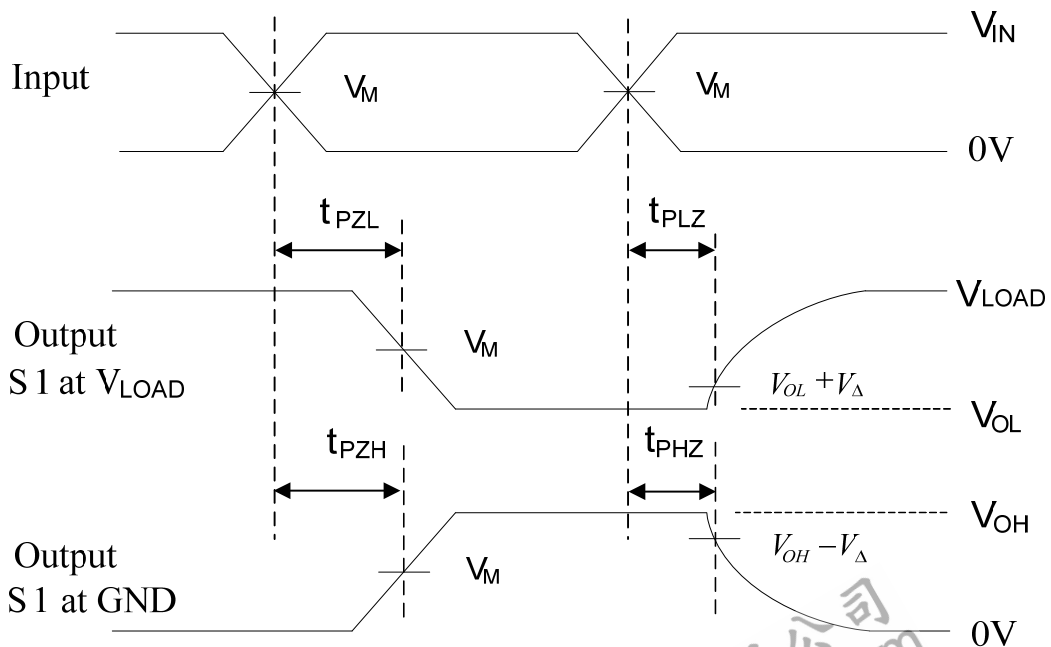
$V_{CC}$	Input		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_{IN}$	$t_r, t_f$					
$3.3V \pm 0.3V$	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$V_{CC}$	15pF	1k $\Omega$	0.3V
					50pF		
$5V \pm 0.5V$	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$V_{CC}$	15pF 50pF	1k $\Omega$	0.5V



■ TEST CIRCUIT AND WAVEFORMS(Cont.)



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES

Note: 1.  $C_L$  includes probe and jig capacitance.  
 2.  $P_{RR} \leq 1\text{MHz}$ ,  $Z_0 = 50\Omega$ ,  $t_R \leq 3\text{ns}$ ,  $t_F \leq 3\text{ns}$ .

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