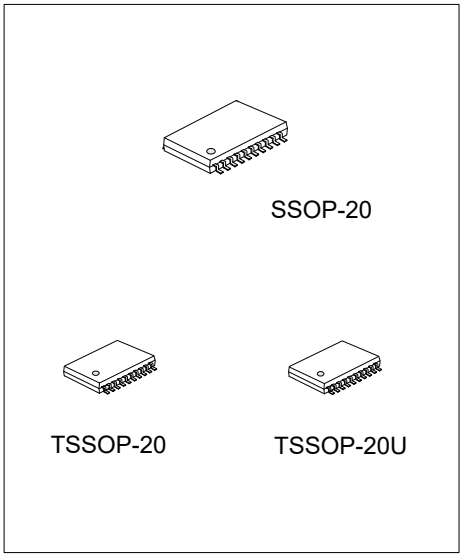
U74AHC574

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.

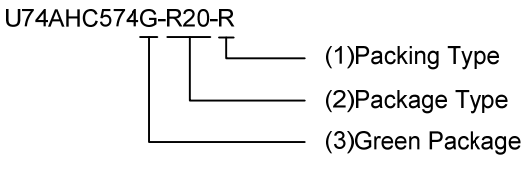
To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pull-up resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

■ 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 4μA
* Typical V_{OL}< 0.36V at V_{CC}=4.5V, I_O=8mA, T_A=25°C
* Typical V_{OH}> 3.94V at V_{CC}=4.5V, I_O =-8mA, T_A=25°C

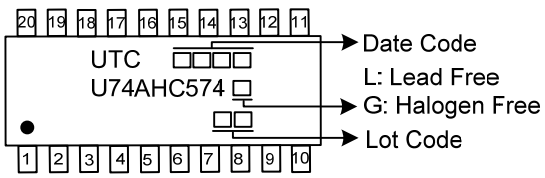
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AHC574L-R20-R	U74AHC574G-R20-R	SSOP-20	Tape Reel
U74AHC574L-P20-R	U74AHC574G-P20-R	TSSOP-20	Tape Reel
U74AHC574L-ULA-R	U74AHC574G-ULA-R	TSSOP-20U	Tape Reel

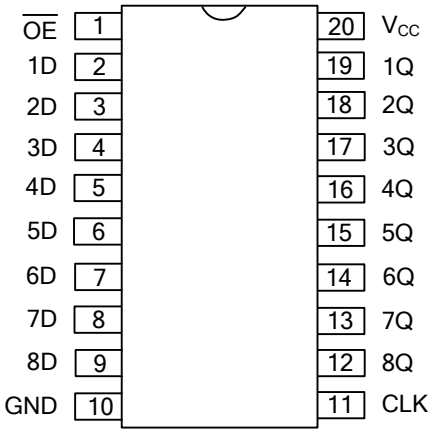


(1) R: Tape Reel
(2) R20: SSOP-20, P20: TSSOP-20
ULA: TSSOP-20U
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



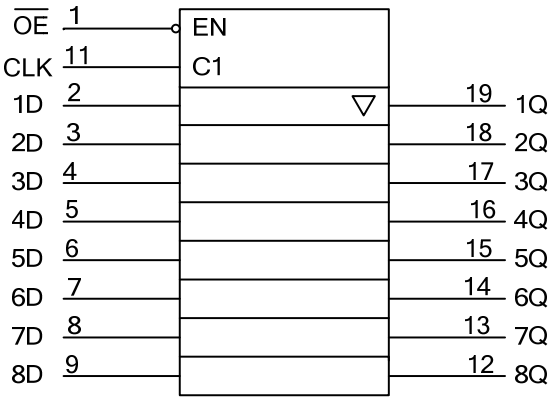
■ PIN CONFIGURATION



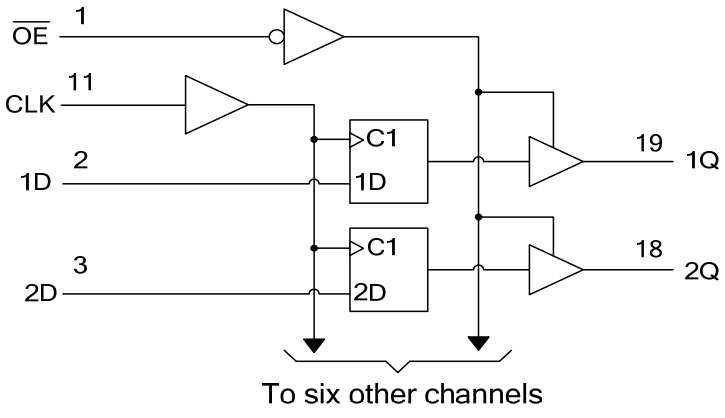
■ FUNCTION TABLE

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 ~ + 125	°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
		V_{CC}=3.3V ± 0.3V			-4	mA
		V_{CC}=5V± 0.5V			-8	
Low-level Output Current	I_{OL}	V_{CC}=2V			50	μA
		V_{CC}=3.3V±0.3V			4	mA
		V_{CC}=5V±0.5V			8	
Input Rise or Fall Times	t_R, t_F	V_{CC}=3.3V±0.3V			100	ns
		V_{CC}=5V±0.5V			20	

■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage High-Level	V_{OH}	V_{CC}=2V, I_{OH}=-50μA	1.9	2		V
		V_{CC}=3V, I_{OH}=-50μA	2.9	3		
		V_{CC}=4.5V, I_{OH}=-50μA	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}=50μA			0.1	V
		V_{CC}=3V, I_{OL}=50μA			0.1	
		V_{CC}=4.5V, I_{OL}=50μA			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 ~ 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

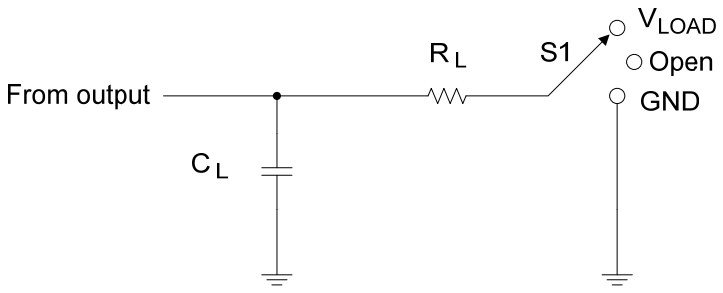
■ SWITCHING CHARACTERISTICS (See TEST CIRCUIT AND WAVEFORMS)

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

■ OPERATING CHARACTERISTICSV(T_A=25°C, unless otherwise specified)

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

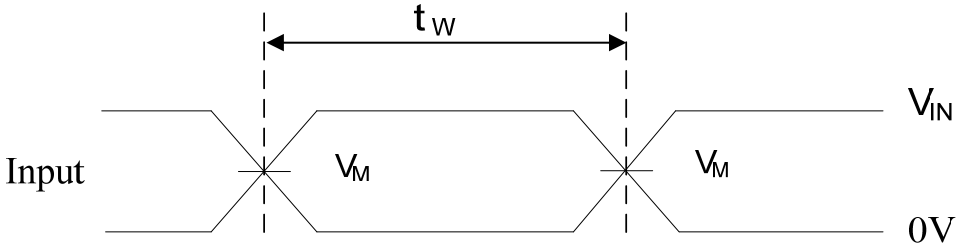
■ TEST CIRCUIT AND WAVEFORMS



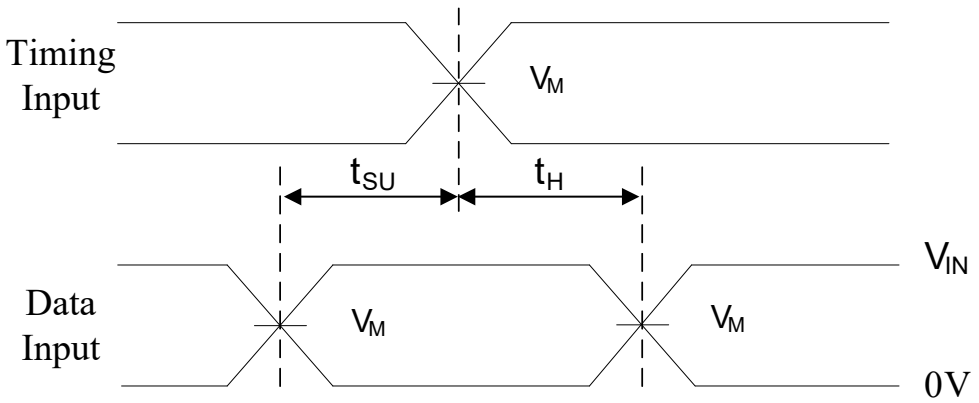
TEST CIRCUIT

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_Δ
	V_{IN}	t_r, t_f					
3.3V±0.3V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	15pF 50pF	1kΩ	0.3V
5V±0.5V	V_{CC}	≤3ns	$V_{CC}/2$	V_{CC}	15pF 50pF	1kΩ	0.5V

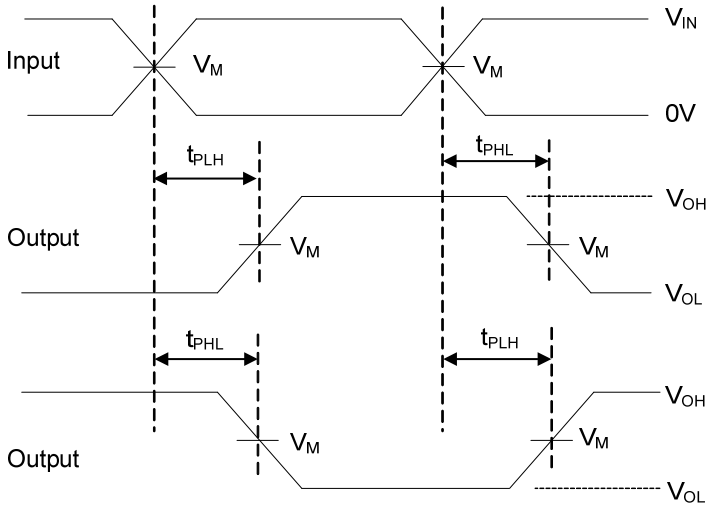


PULSE DURATION

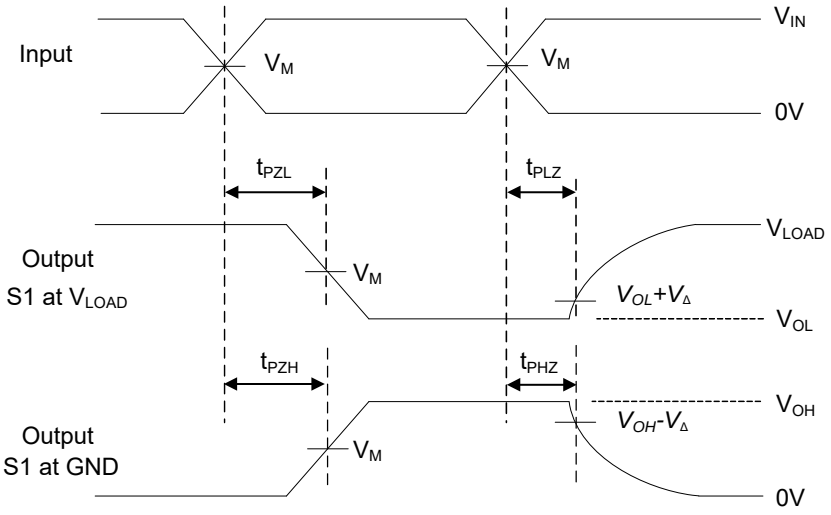


SETUP AND HOLD TIMES

■ TEST CIRCUIT AND WAVEFORMS (Cont.)



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES

Notes: 1. C_L includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: PRR ≤1MHz, Z_O = 50Ω, t_r = 3ns, t_f = 3ns.