



U74HC374

CMOS IC

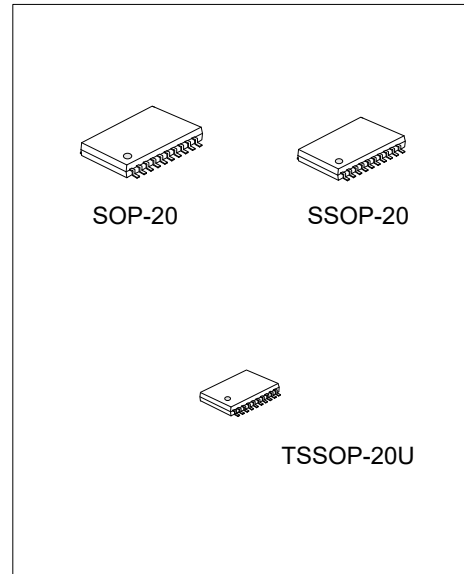
OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS

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 μA , $T_A = 25^\circ C$
- * Typical $V_{OL} < 0.17V$ at $V_{CC} = 4.5V$, $I_{OUT} = -6mA$, $T_A = 25^\circ C$
- * Typical $V_{OH} > 4.3V$ at $V_{CC} = 4.5V$, $I_{OUT} = 6mA$, $T_A = 25^\circ C$

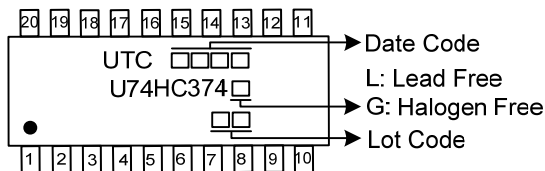


ORDERING INFORMATION

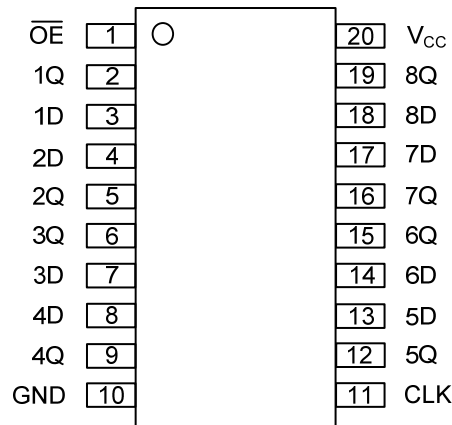
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC374L-S20-R	U74HC374G-S20-R	SOP-20	Tape Reel
U74HC374L-R20-R	U74HC374G-R20-R	SSOP-20	Tape Reel
U74HC374L-ULA-R	U74HC374G-ULA-R	TSSOP-20U	Tape Reel

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



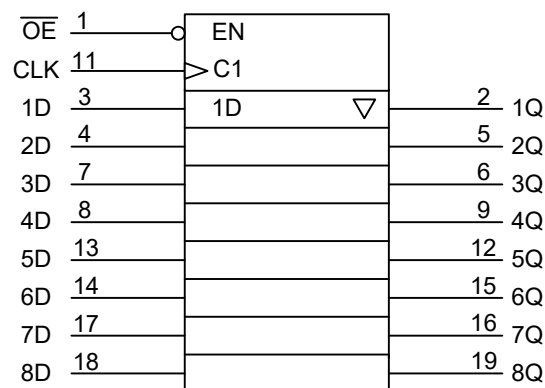
■ PIN CONFIGURATION



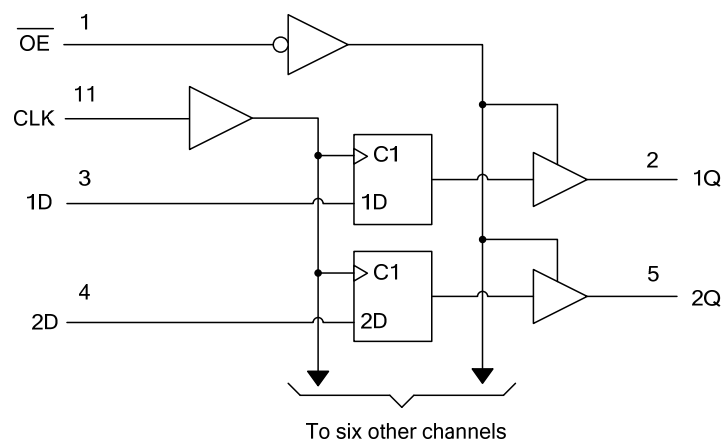
■ FUNCTION TABLE

INPUTS(\overline{OE})	INPUTS(CLK)	INPUTS(D)	OUTPUT(Q)
L	↑	H	H
L	↑	L	L
L	L / H	X	Q0
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
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
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	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
Operating Temperature	T_A		-40		+125	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-20	115	°C/W
	SSOP-20	130	°C/W
	TSSOP-20U	135	°C/W

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

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

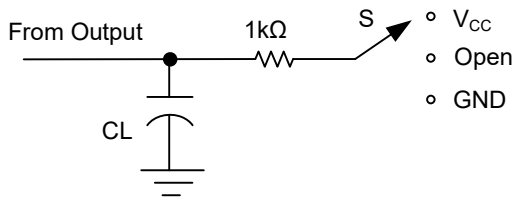
■ SWITCHING CHARACTERISTICS (See TEST CIRCUIT AND WAVEFORMS)

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

■ OPERATING CHARACTERISTICS (Unless otherwise specified)

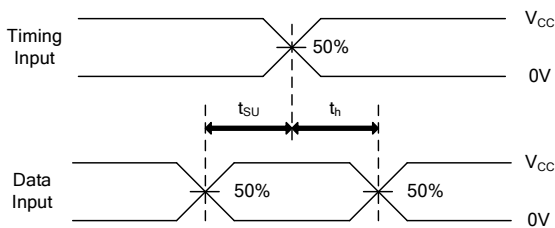
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	No load		100		pF

TEST CIRCUIT AND WAVEFORMS

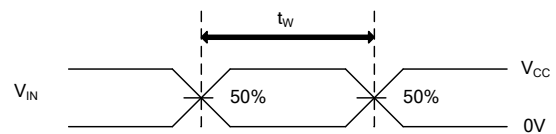


TEST CIRCUIT

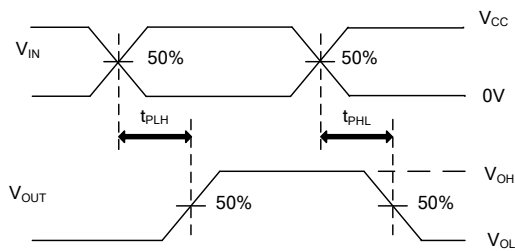
TEST	S
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND
t_{PLZ}/t_{PZL}	V_{CC}



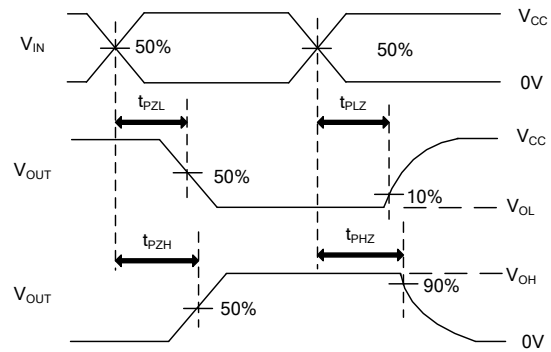
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Notes: 1. C_L includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1\text{MHz}$, $Z_o = 50\Omega$, $t_r = 6\text{ns}$, $t_f = 6\text{ns}$.

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