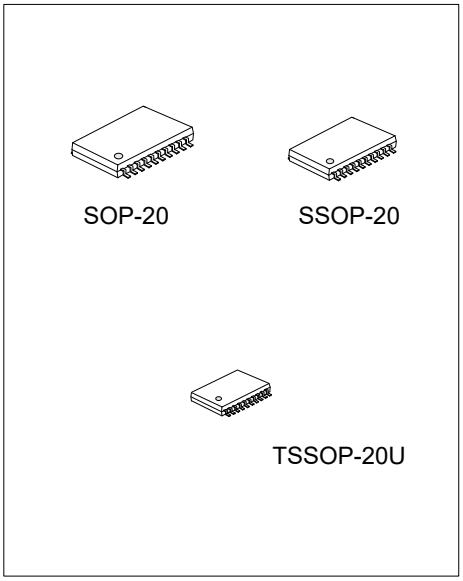
U74HC374

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°C
* Max I_{CC} of 8μA, T_A =25ºC
* Typical V_{OL}<0.17V at V_{CC}=4.5V, I_{OUT}=-6mA,T_A=25°C
* Typical V_{OH} > 4.3V at V_{CC}=4.5V, I_{OUT}=6mA, T_A=25°C

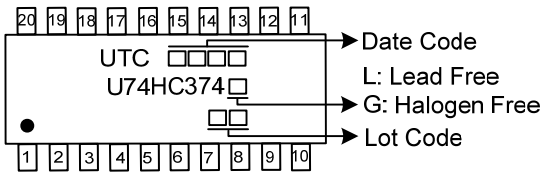
■ ORDERING INFORMATION

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

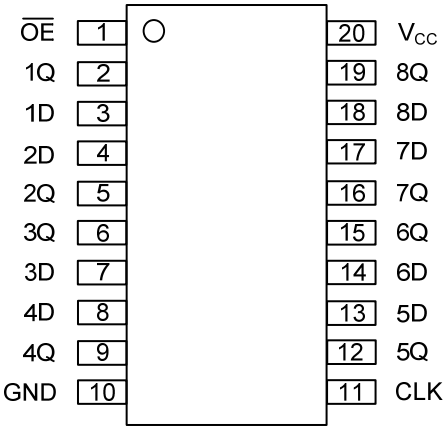
U74HC374G-S20-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) S20: SOP-20, R20: SSOP-20, ULA: TSSOP-20U
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



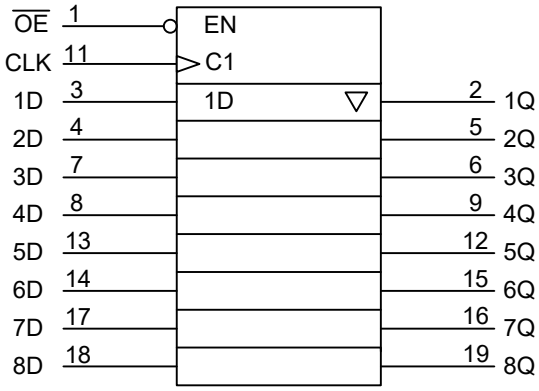
■ PIN CONFIGURATION



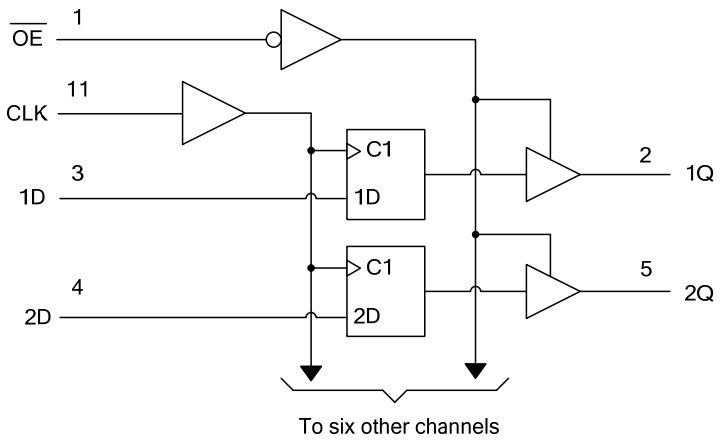
■ FUNCTION TABLE

INPUTS ($\overline{OE}$)	INPUTS(CLK)	INPUTS(D)	OUTPUT(Q)
L	↑	H	H
L	↑	L	L
L	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	θ_{JA}	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}=-20μA	1.9	1.999		V
		V_{CC}=4.5V, I_{OH}=-20μA	4.4	4.499		V
		V_{CC}=6V, I_{OH}=-20μA	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}=20μA		0.002	0.1	V
		V_{CC}=4.5V, I_{OL}=20μA		0.001	0.1	V
		V_{CC}=6V, I_{OL}=20μA		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 ~ 6V		3	10	pF

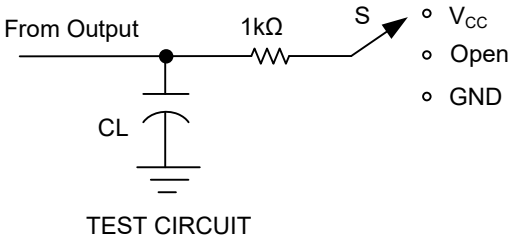
■ SWITCHING CHARACTERISTICS (See TEST CIRCUIT AND WAVEFORMS)

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)

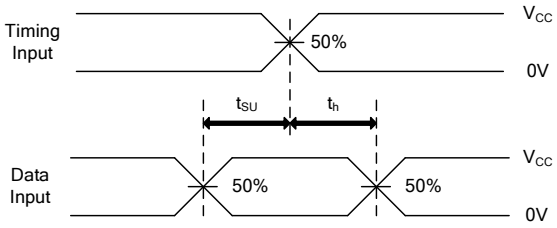
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	No load		100		pF

■ TEST CIRCUIT AND WAVEFORMS

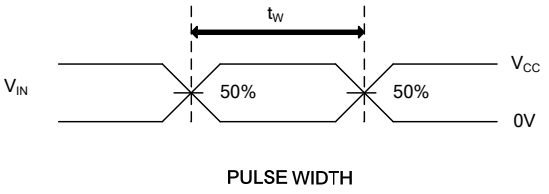


TEST CIRCUIT

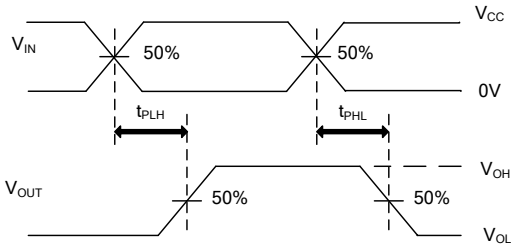
TEST	S
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND
t_{PLZ}/t_{PZL}	V_{CC}



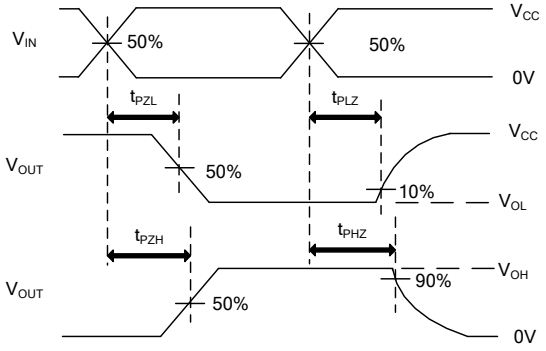
SETUP TIME AND HOLD TIME



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 ≤1MHz, Z_O = 50Ω, t_r = 6ns, t_f = 6ns.