

**U74HC374B**

Preliminary

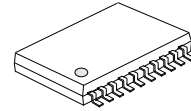
CMOS IC

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

The UTC **U74HC374B** 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, $T_A = 25^\circ\text{C}$
- * Max I_{CC} of 8 μA , $T_A = 25^\circ\text{C}$
- * Typical $V_{OL} < 0.19\text{V}$ at $V_{CC} = 4.5\text{V}$, $I_{OUT} = -6\text{mA}$, $T_A = 25^\circ\text{C}$
- * Typical $V_{OH} > 4.1\text{V}$ at $V_{CC} = 4.5\text{V}$, $I_{OUT} = 6\text{mA}$, $T_A = 25^\circ\text{C}$

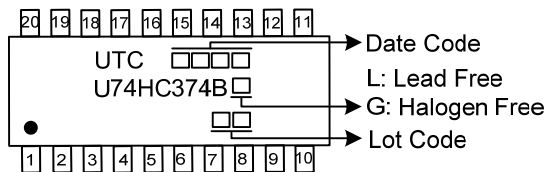


TSSOP-20U

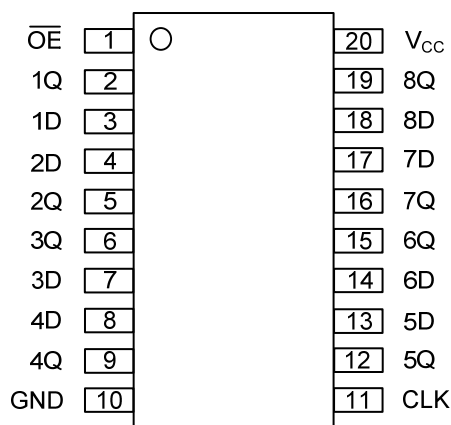
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC374BL-ULA-R	U74HC374BG-ULA-R	TSSOP-20U	Tape Reel

U74HC374BG-ULA-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) ULA: TSSOP-20U (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING

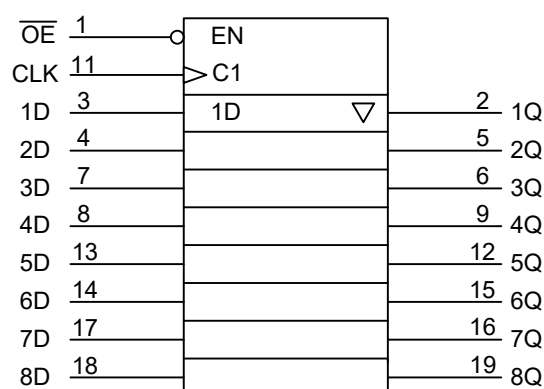
PIN CONFIGURATION



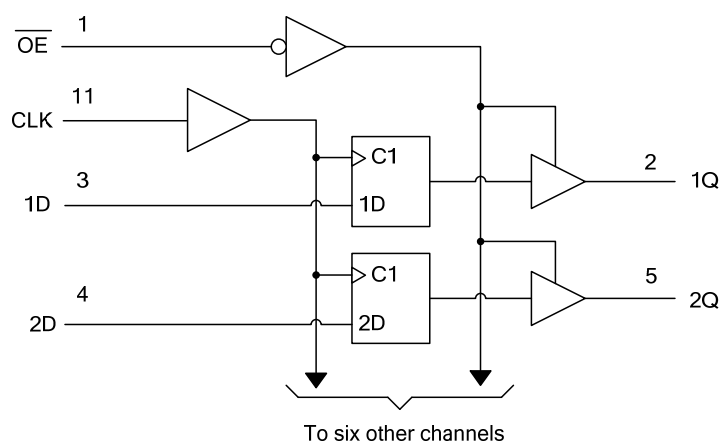
FUNCTION TABLE

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** (Unless otherwise specified) (Note)

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V_{CC}		-0.5 ~ +7	V
V_{CC} or GND Current	I_{CC}		±70	mA
Output Current	I_{OUT}	$V_{OUT}=0$ to V_{CC}	±35	mA
Input Clamp Current	I_{IK}	$V_{IN} < 0$ or $V_{IN} > V_{CC}$	±20	mA
Output Clamp Current	I_{OK}	$V_{OUT} < 0$ or $V_{OUT} > V_{CC}$	±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	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2		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	θ_{JA}	135	°C/W

■ **ELECTRICAL CHARACTERISTICS** (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Output Voltage	V_{OH}	$V_{CC}=2V, I_{OH}=-20\mu A$	1.9	1.998		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	4.1		V
		$V_{CC}=6V, I_{OH}=-7.8mA$	5.48	5.59		V
Low-Level Output Voltage	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
		$V_{CC}=4.5V, I_{OL}=6mA$		0.19	0.26	V
		$V_{CC}=6V, I_{OL}=7.8mA$		0.2	0.26	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND			±100	nA
3-State Leakage Current	I_{OZ}	$V_{CC}=6V, V_{OUT}=V_{CC}$ or GND			±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	$V_{CC}=2V \sim 6V$			10	pF

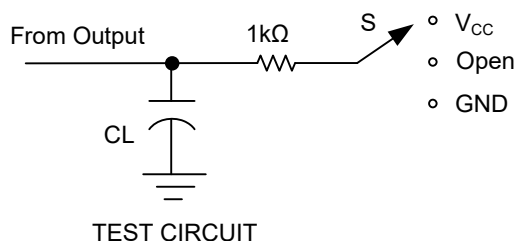
■ **SWITCHING CHARACTERISTICS** (See TEST CIRCUIT AND WAVEFORMS)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Propagation Delay From Input (CLK) to Output (Q)	t_{PLH}/t_{PHL}	$C_L=50\text{pF}$	$V_{CC}=2\text{V}$			180	ns
			$V_{CC}=4.5\text{V}$			36	ns
			$V_{CC}=6\text{V}$			31	ns
		$C_L=150\text{pF}$	$V_{CC}=2\text{V}$			230	ns
			$V_{CC}=4.5\text{V}$			46	ns
			$V_{CC}=6\text{V}$			39	ns
Propagation Delay From Input ($\overline{\text{OE}}$) to Output (Q)	t_{PZL}/t_{PZH}	$C_L=50\text{pF}$	$V_{CC}=2\text{V}$			150	ns
			$V_{CC}=4.5\text{V}$			30	ns
			$V_{CC}=6\text{V}$			26	ns
		$C_L=150\text{pF}$	$V_{CC}=2\text{V}$			200	ns
			$V_{CC}=4.5\text{V}$			40	ns
			$V_{CC}=6\text{V}$			34	ns
Propagation Delay From Input ($\overline{\text{OE}}$) to Output (Q)	t_{PLZ}/t_{PHZ}	$C_L=50\text{pF}$	$V_{CC}=2\text{V}$			150	ns
			$V_{CC}=4.5\text{V}$			30	ns
			$V_{CC}=6\text{V}$			26	ns
Output Transition Time (Any Q)	t_T	$C_L=50\text{pF}$	$V_{CC}=2\text{V}$			60	ns
			$V_{CC}=4.5\text{V}$			30	ns
			$V_{CC}=6\text{V}$			20	ns
		$C_L=150\text{pF}$	$V_{CC}=2\text{V}$			210	ns
			$V_{CC}=4.5\text{V}$			70	ns
			$V_{CC}=6\text{V}$			50	ns
Maximum Clock Frequency	f_{MAX}	$C_L=50\text{pF}$	$V_{CC}=2\text{V}$	6			MHz
			$V_{CC}=4.5\text{V}$	30			MHz
			$V_{CC}=6\text{V}$	35			MHz
		$C_L=150\text{pF}$	$V_{CC}=2\text{V}$	6			MHz
			$V_{CC}=4.5\text{V}$	30			MHz
			$V_{CC}=6\text{V}$	35			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
		$V_{CC}=4.5\text{V}$		30			ns
		$V_{CC}=6\text{V}$		20			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

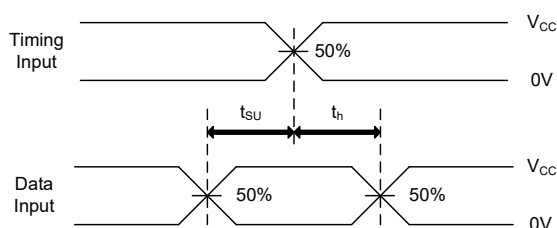
■ **OPERATING CHARACTERISTICS** (Unless otherwise specified)

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

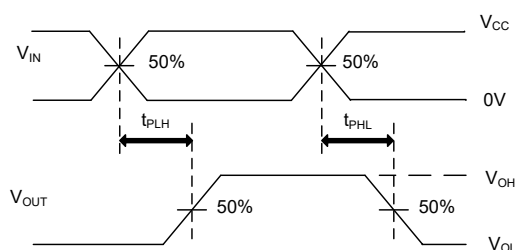
■ TEST CIRCUIT AND WAVEFORMS



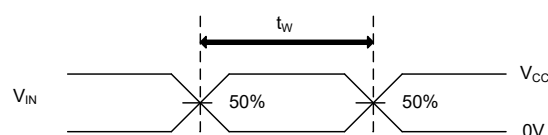
TEST	S
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND
t_{PLZ}/t_{PZL}	V_{CC}



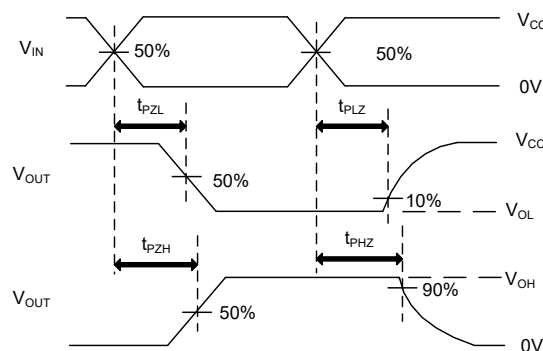
SETUP TIME AND HOLD TIME



PROPAGATION DELAY TIMES



PULSE WIDTH



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: $P_{RR} \leq 1\text{MHz}$, $Z_O = 50\Omega$, $t_r = 6\text{ns}$, $t_f = 6\text{ns}$.

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