



U74HC240

CMOS IC

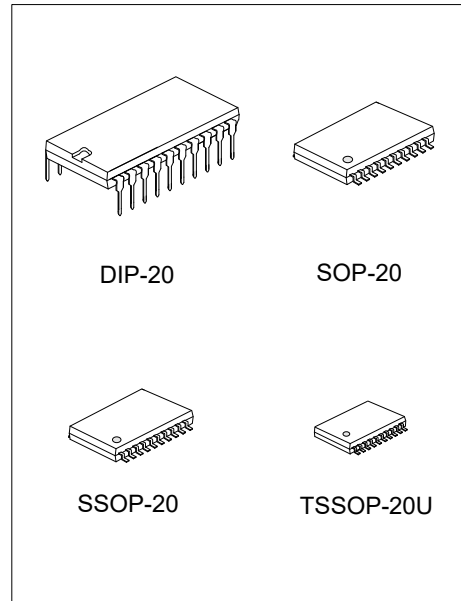
OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

DESCRIPTION

The **U74HC240** is a octal buffer and line driver with 3-state outputs. It is organized as two 4-bit buffers/drivers with separate output-enable (\overline{OE}) inputs. When \overline{OE} is high, the Y outputs are in a high-impedance state and the outputs neither load nor drive the bus lines. When \overline{OE} is low, the device passes inverted data from the A inputs to the Y outputs.

The U74HC240 is designed to improve the performance and density of 3-state memory address drivers, clock drivers and bus-oriented receivers and transmitters.

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; and the minimum value of the resistor is determined by the current-sinking capability of the driver.



FEATURES

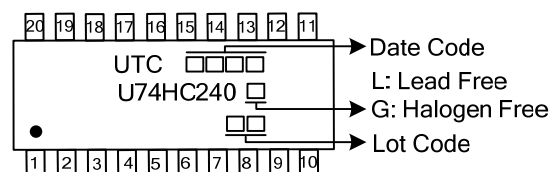
- * Wide supply voltage range from 2V to 6V
- * Max t_{pd} of 9 ns from A to Y at 6V
- * Low power consumption, $I_{CC} = 8 \mu A$ (Max.) at 6V
- * ± 6 mA output driver at 5V
- * Low Input Current of 1 μA Max

ORDERING INFORMATION

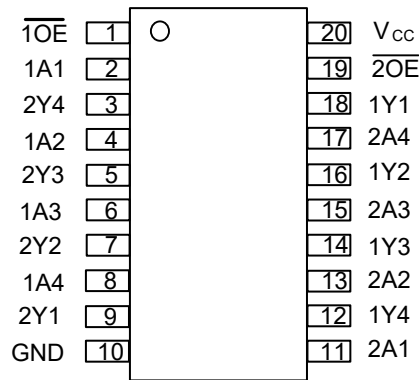
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC240L-D20-T	U74HC240G-D20-T	DIP-20	Tube
U74HC240L-S20-R	U74HC240G-S20-R	SOP-20	Tape Reel
U74HC240L-R20-R	U74HC240G-R20-R	SSOP-20	Tape Reel
U74HC240L-ULA-R	U74HC240G-ULA-R	TSSOP-20U	Tape Reel

<p>U74HC240G-D20-T</p> <ul style="list-style-type: none"> (1) Packing Type (2) Package Type (3) Green Package 	<p>(1) T: Tube, R: Tape Reel (2) D20: DIP-20, S20: SOP-20, R20: SSOP-20 ULA: TSSOP-20U (3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	---

MARKING



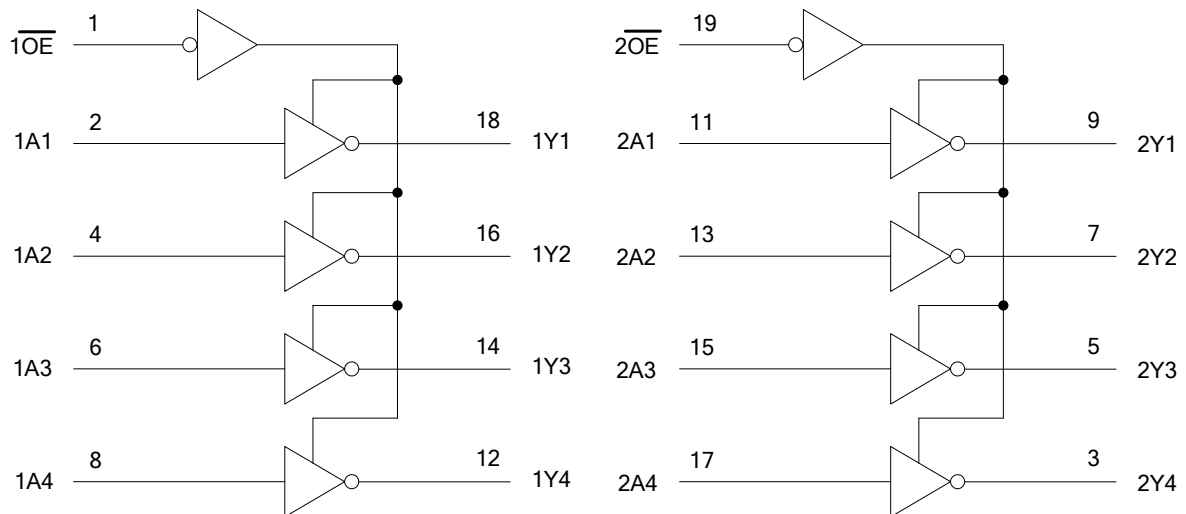
■ PIN CONFIGURATION



■ FUNCTION TABLE (each buffer)

INPUTS		OUTPUT
\overline{OE}	A	Y
L	H	L
L	L	H
H	X	Z

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 7	V
Input Clamp Current ($V_{IN} < 0$, or $V_{IN} > V_{CC}$)	I_{IK}	± 20	mA
Output Clamp Current ($V_{OUT} < 0$, or $V_{OUT} > V_{CC}$)	I_{OK}	± 20	mA
Output Current	I_{OUT}	± 35	mA
V_{CC} or GND Current	I_{CC}	± 70	mA
Storage Temperature	T_{STG}	-65 ~ +150	°C

Notes: 1. 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.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	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}		0		V_{CC}	V
Input Transition Rise or Fall Rate	$\Delta t / \Delta V$	$V_{CC} = 2V$			1000	ns/V
		$V_{CC} = 4.5V$			500	ns/V
		$V_{CC} = 6V$			400	ns/V
Operating Temperature	T_A		-40		+125	°C

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	$T_A = 25^\circ C$			$T_A = -40 \sim +125^\circ C$			UNIT
			MIN	TYP ⁽¹⁾	MAX	MIN	TYP ⁽¹⁾	MAX	
High-Level Output Voltage	V_{OH}	$V_{CC} = 2V, I_{OH} = -20 \mu A$	1.9	1.998		1.9			V
		$V_{CC} = 4.5V, I_{OH} = -20 \mu A$	4.4	4.499		4.4			V
		$V_{CC} = 6V, I_{OH} = -20 \mu A$	5.9	5.999		5.9			V
		$V_{CC} = 4.5V, I_{OH} = -6 \text{ mA}$	3.98	4.3		3.7			V
		$V_{CC} = 6V, I_{OH} = -7.8 \text{ mA}$	5.48	5.8		5.2			V
Low-Level Output Voltage	V_{OL}	$V_{CC} = 2V, I_{OL} = 20 \mu A$		0.002	0.1			0.1	V
		$V_{CC} = 4.5V, I_{OL} = 20 \mu A$		0.001	0.1			0.1	V
		$V_{CC} = 6V, I_{OL} = 20 \mu A$		0.001	0.1			0.1	V
		$V_{CC} = 4.5V, I_{OL} = 6 \text{ mA}$		0.17	0.26			0.4	V
		$V_{CC} = 6V, I_{OL} = 7.8 \text{ mA}$		0.15	0.26			0.4	V
Input Leakage Current (A or \overline{OE} inputs)	$I_{I(LEAK)}$	$V_{CC} = 6V, V_{IN} = V_{CC}$ or GND		± 0.1	± 100			± 100	μA
High-impedance state Current	I_{OZ}	$V_{CC} = 6V, V_O = V_{CC}$ or GND $V_{I(OE)} = V_{IL}$ or V_{IH}		± 0.01	± 0.5			± 10	μA
Quiescent Supply Current	I_{CC}	$V_{CC} = 6V, V_{IN} = V_{CC}$ or GND $I_{OUT} = 0$			8			160	μA

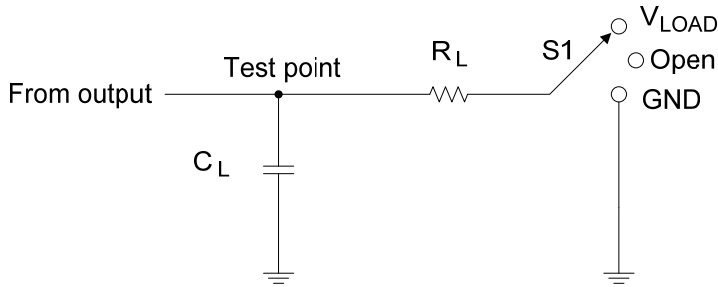
■ SWITCHING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40~+125°C			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
Propagation delay from input A to output Y, t _{pd}	t _{PLH} / t _{PHL}	C _L =50pF, R _L =1kΩ	V _{CC} =2V		50	100			150	ns
			V _{CC} =4.5V		10	20			30	ns
			V _{CC} =6V		9	17			26	ns
		C _L =150pF, R _L =1kΩ	V _{CC} =2V		75	150			190	ns
			V _{CC} =4.5V		15	30			38	ns
			V _{CC} =6V		13	26			32	ns
Output enable time from input \overline{OE} to output Y, t _{en}	t _{PZH} / t _{PZL}	C _L =50pF, R _L =1kΩ	V _{CC} =2V		75	150			225	ns
			V _{CC} =4.5V		15	30			45	ns
			V _{CC} =6V		13	26			38	ns
		C _L =150pF, R _L =1kΩ	V _{CC} =2V		100	200			250	ns
			V _{CC} =4.5V		20	40			50	ns
			V _{CC} =6V		17	34			43	ns
Output disable time from input \overline{OE} to output Y, t _{dis}	t _{PHZ} / t _{PLZ}	C _L =50pF, R _L =1kΩ	V _{CC} =2V		44	150			225	ns
			V _{CC} =4.5V		22	30			45	ns
			V _{CC} =6V		21	26			38	ns
Propagation of rise or fall, t _t	t _r / t _f	C _L =50pF, R _L =1kΩ	V _{CC} =2V		28	60			90	ns
			V _{CC} =4.5V		8	12			18	ns
			V _{CC} =6V		6	10			15	ns
		C _L =150pF, R _L =1kΩ	V _{CC} =2V		45	210			265	ns
			V _{CC} =4.5V		17	42			53	ns
			V _{CC} =6V		13	36			45	ns

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C _{IN}	V _{CC} = 2V to 6V, V _{IN} = V _{CC} or GND		3	10	pF
Power dissipation capacitance per buffer/driver	C _{PD}	No load		35		pF

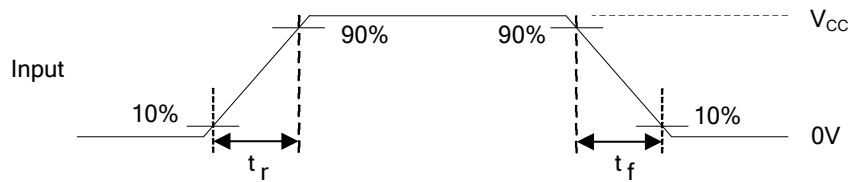
■ TEST CIRCUIT AND WAVEFORMS



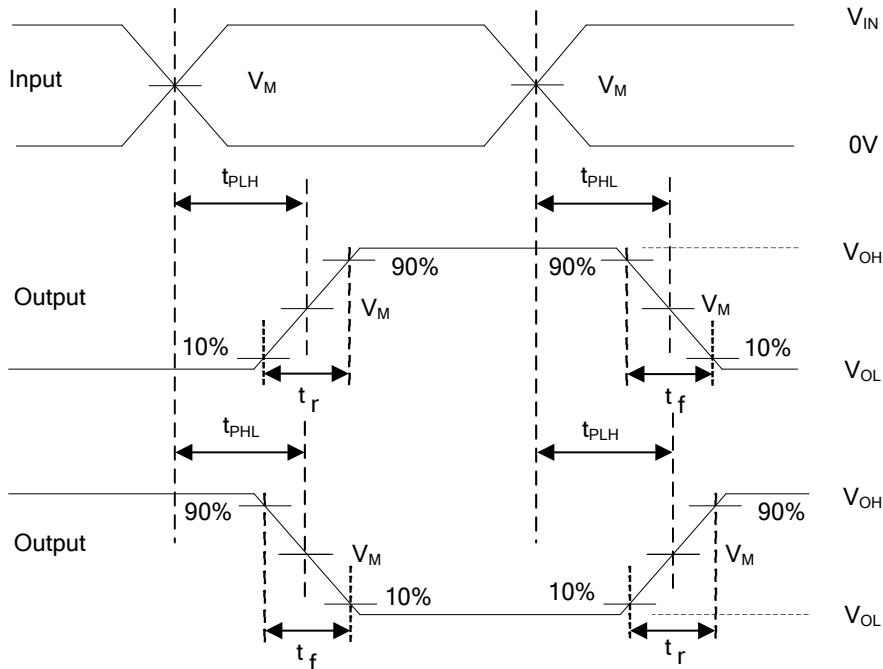
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

TEST CIRCUIT

Inputs		V_M	V_{LOAD}	C_L	R_L
V_{IN}	t_r, t_f				
V_{CC}	$\leq 6ns$	$V_{CC}/2$	V_{CC}	50 or 150pF	500Ω

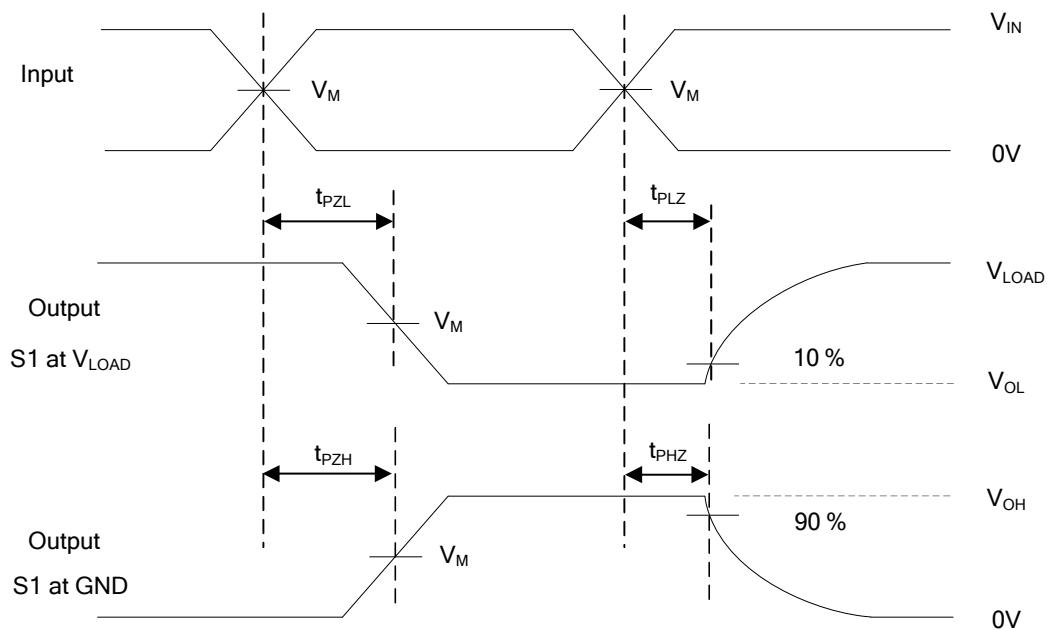


VOLTAGE WAVEFORMS INPUT RISE AND FALL TIMES



VOLTAGE WAVEFORMS PROPAGATION DELAY AND OUTPUT TRANSITION TIMES

■ TEST CIRCUIT AND WAVEFORMS (Cont.)



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 ≤ 1 MHz, $Z_O = 50\Omega$.

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.