



## U74HC240

CMOS IC

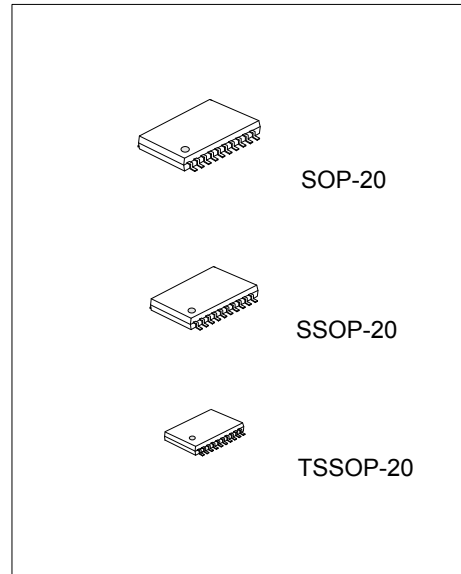
### OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

#### 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

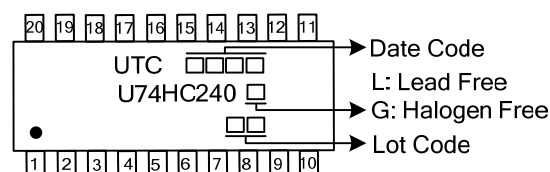
- \* Wide supply voltage range from 2V to 6V
- \* Max  $t_{pd}$  of 9 ns from A to Y at 6V
- \* Low power consumption,  $I_{CC} = 8 \mu A$  (Max.) at 6V
- \*  $\pm 6$  mA output driver at 5V
- \* Low Input Current of 1  $\mu A$  Max

#### ORDERING INFORMATION

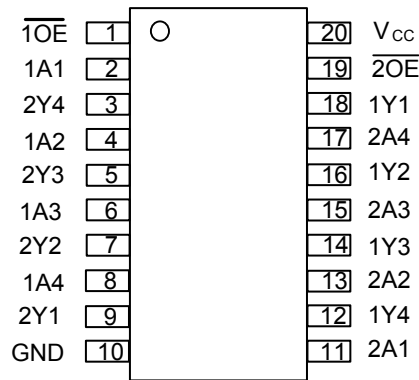
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC240L-S20-R	U74HC240G-S20-R	SOP-20	Tape Reel
U74HC240L-R20-R	U74HC240G-R20-R	SSOP-20	Tape Reel
U74HC240L-P20-R	U74HC240G-P20-R	TSSOP-20	Tape Reel

<p>U74HC240G-R20-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, P20: TSSOP-20 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



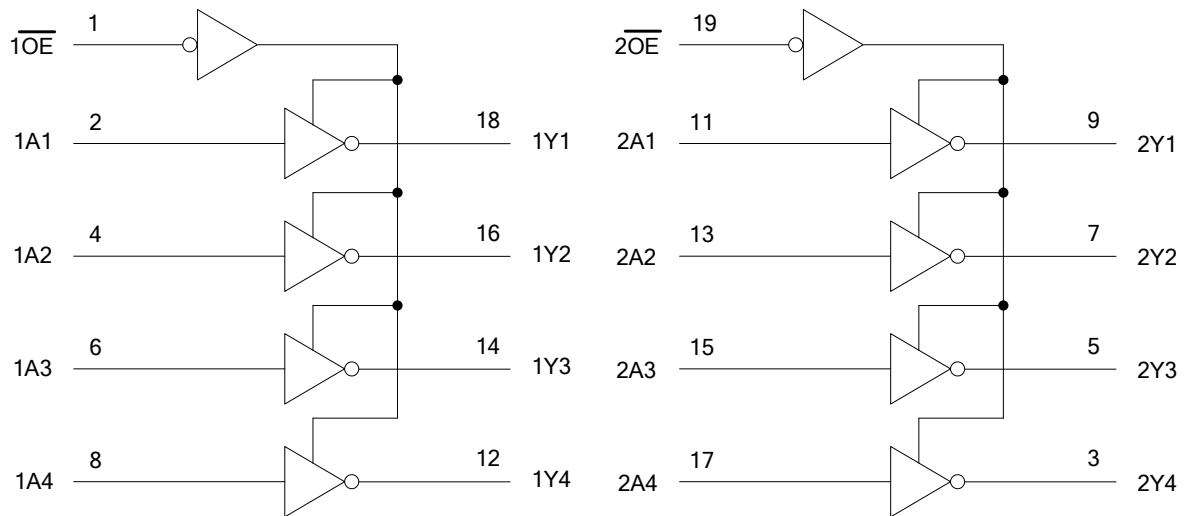
■ PIN CONFIGURATION



■ 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 $V_{IN} > V_{CC}$ )	$I_{IK}$	$\pm 20$	mA
Output Clamp Current ( $V_{OUT} < 0$ , or $V_{OUT} > V_{CC}$ )	$I_{OK}$	$\pm 20$	mA
Output Current	$I_{OUT}$	$\pm 35$	mA
$V_{CC}$ or GND Current	$I_{CC}$	$\pm 70$	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 COMDITIONS

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			
		$V_{CC} = 6V$	4.2			
Low-Level Input Voltage	$V_{IL}$	$V_{CC} = 2V$			0.5	V
		$V_{CC} = 4.5V$			1.35	
		$V_{CC} = 6V$			1.8	
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	
		$V_{CC} = 6V$			400	
Operating Temperature	$T_A$		-40		85	°C

■ ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ C$  , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP <sup>(1)</sup>	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		
		$V_{CC} = 6V, I_{OH} = -20 \mu A$	5.9	5.999		
		$V_{CC} = 4.5V, I_{OH} = -6 \text{ mA}$	3.98	4.3		
		$V_{CC} = 6V, I_{OH} = -7.8 \text{ mA}$	5.48	5.8		
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	
		$V_{CC} = 6V, I_{OL} = 20 \mu A$		0.001	0.1	
		$V_{CC} = 4.5V, I_{OL} = 6 \text{ mA}$		0.17	0.26	
		$V_{CC} = 6V, I_{OL} = 7.8 \text{ mA}$		0.15	0.26	
Input Leakage Current (A or $\overline{OE}$ inputs)	$I_{I(LEAK)}$	$V_{CC} = 6V, V_{IN} = V_{CC}$ or GND		$\pm 0.1$	$\pm 100$	$\mu A$
High-impedance state Current	$I_{OZ}$	$V_{CC} = 6V, V_O = V_{CC}$ or GND $V_{I(OE)} = V_{IL}$ or $V_{IH}$		$\pm 0.01$	$\pm 0.5$	$\mu A$
Quiescent Supply Current	$I_{CC}$	$V_{CC} = 6V, V_{IN} = V_{CC}$ or GND $I_{OUT} = 0$			8	$\mu A$
Input Capacitance	$C_{IN}$	$V_{CC} = 2V$ to $6V, V_{IN} = V_{CC}$ or GND		3	10	pF

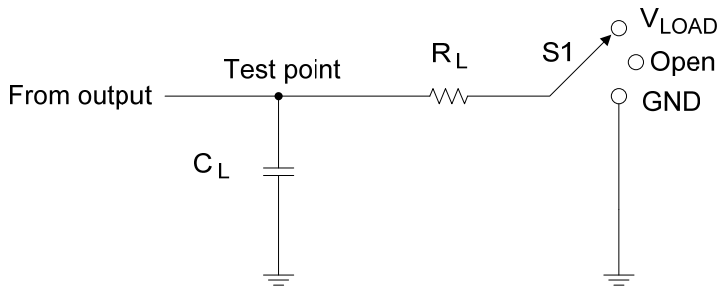
■ SWITCHING CHARACTERISTICS (T<sub>A</sub> =25°C , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Propagation delay from input A to output Y, t <sub>pd</sub>	t <sub>PLH</sub> / t <sub>PHL</sub>	C <sub>L</sub> =50pF, R <sub>L</sub> =1kΩ	V <sub>CC</sub> =2V		50	100	ns
			V <sub>CC</sub> =4.5V		10	20	
			V <sub>CC</sub> =6V		9	17	
		C <sub>L</sub> =150pF, R <sub>L</sub> =1kΩ	V <sub>CC</sub> =2V		75	150	ns
			V <sub>CC</sub> =4.5V		15	30	
			V <sub>CC</sub> =6V		13	26	
Output enable time from input $\overline{OE}$ to output Y, t <sub>en</sub>	t <sub>PZH</sub> / t <sub>PZL</sub>	C <sub>L</sub> =50pF, R <sub>L</sub> =1kΩ	V <sub>CC</sub> =2V		75	150	ns
			V <sub>CC</sub> =4.5V		15	30	
			V <sub>CC</sub> =6V		13	26	
		C <sub>L</sub> =150pF, R <sub>L</sub> =1kΩ	V <sub>CC</sub> =2V		100	200	ns
			V <sub>CC</sub> =4.5V		20	40	
			V <sub>CC</sub> =6V		17	34	
Output disable time from input $\overline{OE}$ to output Y, t <sub>dis</sub>	t <sub>PHZ</sub> / t <sub>PLZ</sub>	C <sub>L</sub> =50pF, R <sub>L</sub> =1kΩ	V <sub>CC</sub> =2V		44	150	ns
			V <sub>CC</sub> =4.5V		22	30	
			V <sub>CC</sub> =6V		21	26	
Propagation of rise or fall, t <sub>t</sub>	t <sub>r</sub> / t <sub>f</sub>	C <sub>L</sub> =50pF, R <sub>L</sub> =1kΩ	V <sub>CC</sub> =2V		28	60	ns
			V <sub>CC</sub> =4.5V		8	12	
			V <sub>CC</sub> =6V		6	10	
		C <sub>L</sub> =150pF, R <sub>L</sub> =1kΩ	V <sub>CC</sub> =2V		45	210	ns
			V <sub>CC</sub> =4.5V		17	42	
			V <sub>CC</sub> =6V		13	36	

■ OPERATING CHARACTERISTICS (T<sub>A</sub> =25°C , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power dissipation capacitance per buffer/driver	C <sub>PD</sub>	No load		35		pF

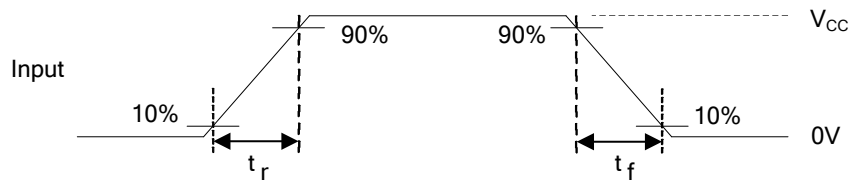
## TEST CIRCUIT AND WAVEFORMS



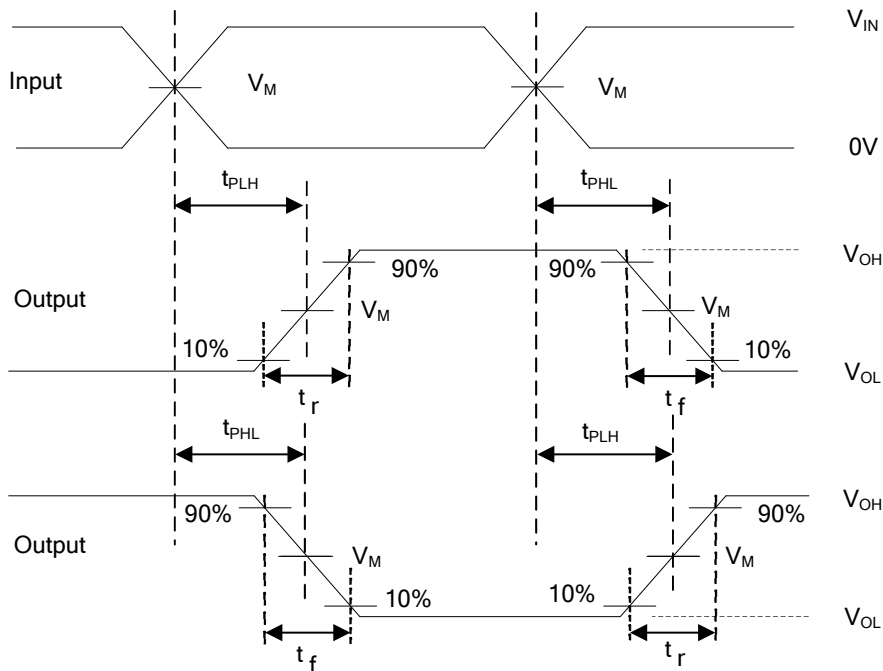
TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	$V_{LOAD}$
$t_{PHZ}/t_{PZH}$	GND

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

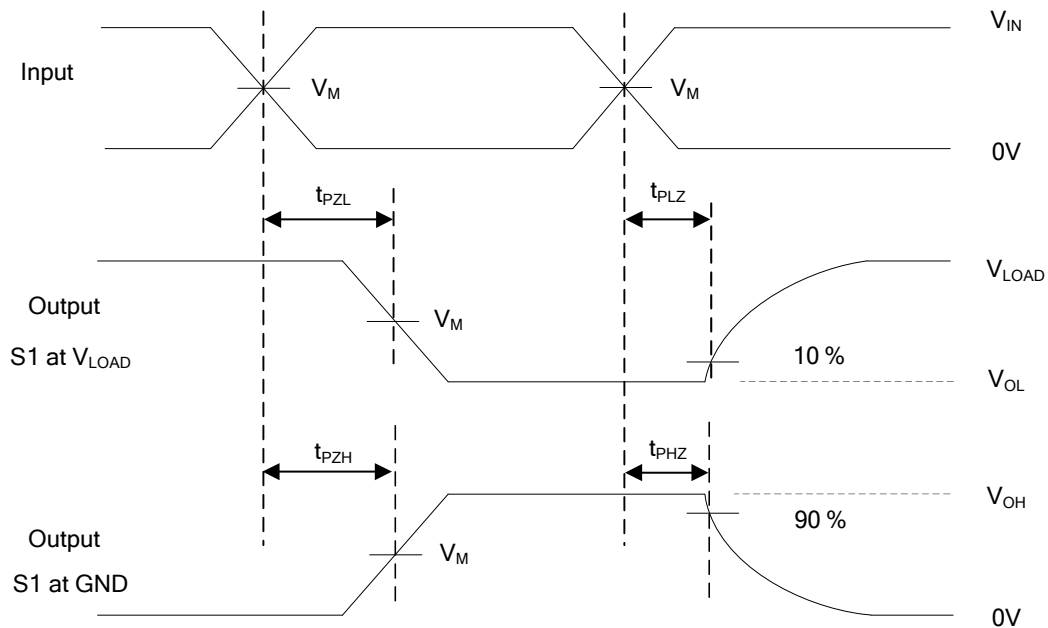


VOLTAGE WAVEFORMS INPUT RISE AND FALL TIMES



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:  $PRR \leq 1\text{MHz}$ ,  $Z_O = 50\Omega$ .

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