

0A, 0B

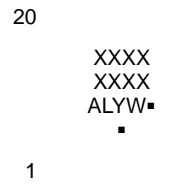
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**SOIC 20  
DW SUFFIX  
CASE 751D**

**TSSOP 20  
DT SUFFIX  
CASE 948E**

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**MARKING DIAGRAMS**



# MC74VHC374, MC74VHCT374A

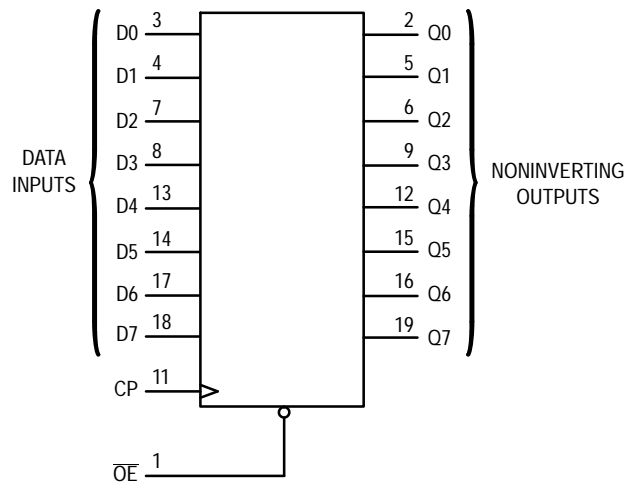


Figure 1. Logic Diagram

## MC74VHC374, MC74VHCT374A

4. Tested to EIA/JESD78 Class II.



## MC74VHC374, MC74VHCT374A

### NOISE CHARACTERISTICS (MC74VHC374) ( $C_L = 50 \text{ pF}$ , $V_{CC} = 5.0 \text{ V}$ )

Symbol	Parameter	$T_A = 25^\circ\text{C}$		Unit
		Typ	Max	
$V_{OLP}$	Quiet Output Maximum Dynamic $V_{OL}$	0.6	0.9	V
$V_{OLV}$	Quiet Output Minimum Dynamic $V_{OL}$	-0.6	-0.9	V
$V_{IHD}$	Minimum High Level Dynamic Input Voltage		3.5	V
$V_{ILD}$	Maximum Low Level Dynamic Input Voltage		1.5	V

### TIMING REQUIREMENTS (MC74VHC374)

Symbol	Parameter	Test Conditions	$T_A = 25^\circ\text{C}$		$T_A = 40$ to $85^\circ\text{C}$	Unit
			Typ	Limit	Limit	
$t_w$	Minimum Pulse Width, CP	$V_{CC} = 3.3 \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \pm 0.5 \text{ V}$		5.0 5.0	5.5 5.0	ns
$t_{su}$	Minimum Setup Time, D to CP	$V_{CC} = 3.3 \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \pm 0.5 \text{ V}$		4.5 3.0	4.5 3.0	ns
$t_h$	Minimum Hold Time, D to CP	$V_{CC} = 3.3 \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \pm 0.5 \text{ V}$		2.0 2.0	2.0 2.0	ns
$t_r, t_f$	Maximum Input Rise and Fall Times	$V_{CC} = 3.3 \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \pm 0.5 \text{ V}$				ns

# MC74VHC374, MC74VHCT374A

## DC ELECTRICAL CHARACTERISTICS (MC74VHCT374A)

Symbol	Parameter	Test Conditions	V <sub>CC</sub> V	T <sub>A</sub> = 25°C			T <sub>A</sub> = 40 to 85°C		Unit
				Min	Typ	Max	Min	Max	
V <sub>IH</sub>	Minimum High-Level Input Voltage		4.5 to 5.5	2.0			2.0		V
V <sub>IL</sub>	Maximum Low-Level Input Voltage		4.5 to 5.5			0.8		0.8	V
V <sub>OH</sub>	Minimum High-Level Output Voltage V <sub>in</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -50 μA	4.5	4.4	4.5		4.4		V
		I <sub>OH</sub> = -8 mA	4.5	3.94			3.80		
V <sub>OL</sub>	Maximum Low-Level Output Voltage V <sub>in</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 50 μA	4.5		0.0	0.1		0.1	V
		I <sub>OL</sub> = 8 mA	4.5			0.36		0.44	
I <sub>in</sub>	Maximum Input Leakage Current	V <sub>in</sub> = 5.5 V or GND	0 to 5.5			±0.1		±1.0	μA
I <sub>OZ</sub>	Maximum 3-State Leakage Current	V <sub>in</sub> = V <sub>IL</sub> or V <sub>IH</sub> V <sub>out</sub> = V <sub>CC</sub> or GND	5.5			±0.25		±2.5	μA
I <sub>CC</sub>	Maximum Quiescent Supply Current	V <sub>in</sub> = V <sub>CC</sub> or GND	5.5			4.0		40.0	μA
I <sub>CC(T)</sub>	Quiescent Supply Current	Per Input: V <sub>IN</sub> = 3.4 V Other Input: V <sub>CC</sub> or GND	5.5			1.35		1.50	mA
I <sub>OPD</sub>	Output Leakage Current	V <sub>OUT</sub> = 5.5 V	0			0.5		5.0	μA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## AC ELECTRICAL CHARACTERISTICS (MC74VHCT374A)

Symbol	Parameter	Test Conditions	T <sub>A</sub> = 25°C			T <sub>A</sub> = 40 to 85°C		Unit
			Min	Typ	Max	Min	Max	
f <sub>max</sub>	Maximum Clock Frequency (50% Duty Cycle)	V <sub>CC</sub> = 5.0 ± 0.5 V C <sub>L</sub> = 15 pF C <sub>L</sub> = 50 pF	90 85	140 130		80 95		MHz
t <sub>PLH</sub> , t <sub>PHL</sub>	Maximum Propagation Delay, CP to Q	V <sub>CC</sub> = 5.0 ± 0.5 V C <sub>L</sub> = 15 pF C <sub>L</sub> = 50 pF		4.1 5.6	9.4 10.4	1.0 1.0	10.5 11.5	ns
t <sub>PZL</sub> , t <sub>PZH</sub>	Output Enable Time, OE to Q	V <sub>CC</sub> = 5.0 ± 0.5 V C <sub>L</sub> = 15 pF C <sub>L</sub> = 50 pF		6.5 7.3	10.2 11.2	1.0 1.0	11.5 12.5	ns
t <sub>PLZ</sub> , t <sub>PHZ</sub>	Output Disable Time OE to Q	V <sub>CC</sub> = 5.0 ± 0.5 V C <sub>L</sub> = 50 pF		7.0	11.2	1.0	12.0	ns
t <sub>OSLH</sub> , t <sub>OSHL</sub>	Output to Output Skew	V <sub>CC</sub> = 5.0 ± 0.5 V C <sub>L</sub> = 50 pF (Note 8)			1.0		1.0	ns
C <sub>in</sub>	Maximum Input Capacitance			4	10		10	pF
C <sub>out</sub>	Maximum 3-State Output Capacitance (Output in High-Impedance State)			9				pF

C <sub>PD</sub>	Power Dissipation Capacitance (Note 9)	Typical @ 25°C, V <sub>CC</sub> = 5.0 V		pF
		25		

8. Parameter guaranteed by design. t<sub>OSLH</sub> = |t<sub>PLHm</sub> - t<sub>PLHn</sub>|, t<sub>OSHL</sub> = |t<sub>PHLm</sub> - t<sub>PHLn</sub>|.

9. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>/8 (per flip-flop). C<sub>PD</sub> is used to determine the no-load dynamic power consumption; P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

## MC74VHC374, MC74VHCT374A

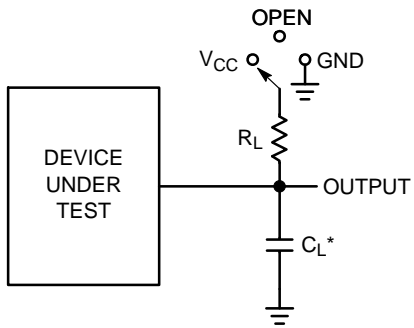
### NOISE CHARACTERISTICS (MC74VHCT374A) ( $C_L = 50 \text{ pF}$ , $V_{CC} = 5.0 \text{ V}$ )

Symbol	Parameter	$T_A = 25^\circ\text{C}$		Unit
		Typ	Max	
$V_{OLP}$	Quiet Output Maximum Dynamic $V_{OL}$	1.2	1.6	V
$V_{OLV}$	Quiet Output Minimum Dynamic $V_{OL}$	-1.2	-1.6	V
$V_{IHD}$	Minimum High Level Dynamic Input Voltage		2.0	V
$V_{ILD}$	Maximum Low Level Dynamic Input Voltage		0.8	V

### TIMING REQUIREMENTS (MC74VHCT374A)

Symbol	Parameter	Test Conditions	$T_A = 25^\circ\text{C}$		$T_A = 40 \text{ to } 85^\circ\text{C}$	Unit
			Typ	Limit	Limit	
$t_w$	Minimum Pulse Width, CP	$V_{CC} = 5.0 \pm 0.5 \text{ V}$		6.5	8.5	ns
$t_{su}$	Minimum Setup Time, D to CP	$V_{CC} = 5.0 \pm 0.5 \text{ V}$		2.5	2.5	ns
$t_h$	Minimum Hold Time, D to CP	$V_{CC} = 5.0 \pm 0.5 \text{ V}$		2.5	2.5	ns

# MC74VHC374, MC74VHCT374A



\* $C_L$  Includes probe and jig capacitance  
 Input signal  $t_R = t_F = 3 \text{ ns}$

Test	Switch Position	$C_L$	$R_L$
$t_{PLH} / t_{PHL}$	Open	See AC	



## MC74VHC374, MC74VHCT374A

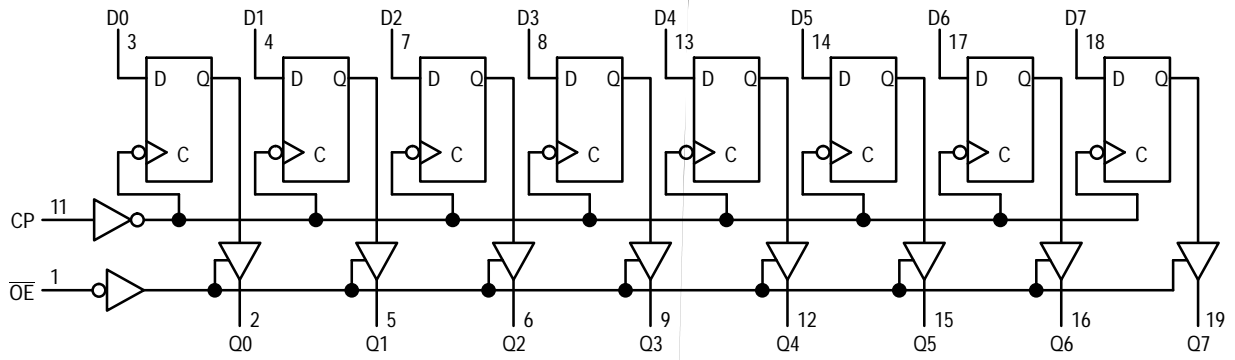


Figure 6. Expanded Logic Diagram

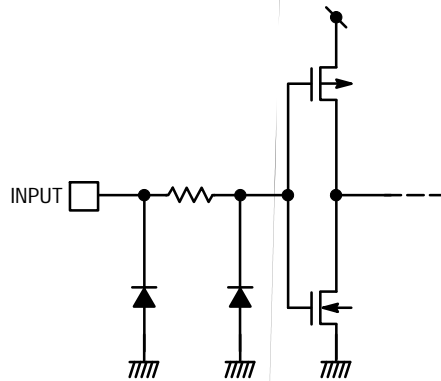


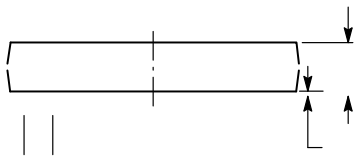
Figure 7. Input Equivalent Circuit

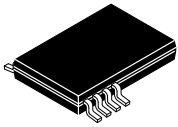
### ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
MC74VHC374DWR2G	VHC374G	SOIC-20W	1000 / Tape & Reel
MC74VHC374DTR2G	VHC 374	TSSOP-20	2500 / Tape & Reel
MC74VHCT374ADWR2G			

SOIC-20 WB  
CASE 751D-05  
ISSUE H

DATE 22 APR 2015





SCALE 2:1

**TSSOP-20 WB**  
CASE 948E  
ISSUE D

DATE 17 FEB 2016

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