

## MM54HC34/MM74HC34 Non-Inverter

### General Description

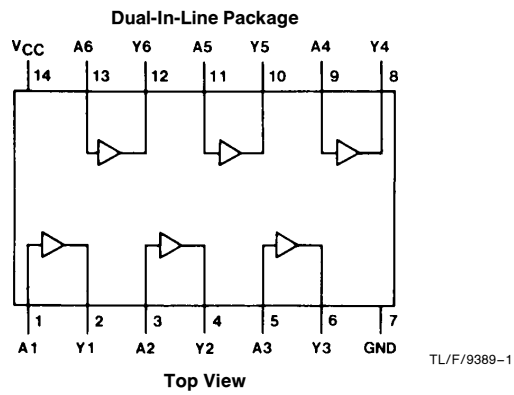
The MM54HC34/MM74HC34 are logic functions fabricated by using advanced silicon-gate CMOS technology which provides the inherent benefits of CMOS—low quiescent power and wide power supply range, but are functionally as well as pin-out compatible with standard DM54LS/74LS devices. The MM54HC34/MM74HC34 feature low power dis-

sipation and fast switching times. All inputs are protected from static discharge by internal diodes to  $V_{CC}$  and ground.

### Features

- Fast switching:  $t_{PLH}$ ,  $t_{PHL}$  = 10 ns (typ)
- High fanout:  $\geq 10$  LS loads

### Connection Diagram



TL/F/9389-1

Order Number MM54HC34 or MM74HC34

## Absolute Maximum Ratings (Notes 1 & 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V
DC Input Voltage ( $V_{IN}$ )	-1.5V to $V_{CC}$ + 1.5V
DC Output Voltage ( $V_{OUT}$ )	-0.5V to $V_{CC}$ + 0.5V
Clamp Diode Current ( $I_{IK}, I_{OK}$ )	±20 mA
DC Output Current, per pin ( $I_{OUT}$ )	±25 mA
DC $V_{CC}$ or GND Current, per pin ( $I_{ICC}$ )	±50 mA
Storage Temperature Range ( $T_{STG}$ )	-65°C to +150°C
Power Dissipation ( $P_D$ ) (Note 3)	600 mW
S.O. Package only	500 mW
Lead Temperature ( $T_L$ ) (Soldering 10 seconds)	260°C

## Operating Conditions

	Min	Max	Units
Supply Voltage ( $V_{CC}$ )	2	6	V
DC Input or Output Voltage ( $V_{IN}, V_{OUT}$ )	0	$V_{CC}$	V
Operating Temp. Range ( $T_A$ )			
MM74HC	-40	+85	°C
MM54HC	-55	+125	°C
Input Rise or Fall Times ( $t_r, t_f$ )			
$V_{CC} = 2.0V$		1000	ns
$V_{CC} = 4.5V$		500	ns
$V_{CC} = 6.0V$		400	ns

## DC Electrical Characteristics (Note 4)

Symbol	Parameter	Conditions	$V_{CC}$	$T_A = 25^\circ C$			Units	
				Typ	74HC $T_A = -40 \text{ to } +85^\circ C$	54HC $T_A = -55 \text{ to } +125^\circ C$		
$V_{IH}$	Minimum High Level Input Voltage		2.0V	1.5	1.5	1.5	V	
			4.5V	3.15	3.15	3.15	V	
			6.0V	4.2	4.2	4.2	V	
$V_{IL}$	Maximum Low Level Input Voltage**		2.0V	0.5	0.5	0.5	V	
			4.5V	1.35	1.35	1.35	V	
			6.0V	1.8	1.8	1.8	V	
$V_{OH}$	Minimum High Level Output Voltage	$V_{IN} = V_{IL}$ $ I_{OUT}  \leq 20 \mu A$	2.0V	2.0	1.9	1.9	V	
			4.5V	4.5	4.4	4.4	V	
			6.0V	6.0	5.9	5.9	V	
		$V_{IN} = V_{IL}$ $ I_{OUT}  \leq 4.0 \text{ mA}$ $ I_{OUT}  \leq 5.2 \text{ mA}$	4.5V	4.2	3.98	3.84	3.7	V
			6.0V	5.7	5.48	5.34	5.2	V
$V_{OL}$	Maximum Low Level Output Voltage	$V_{IN} = V_{IH}$ $ I_{OUT}  \leq 20 \mu A$	2.0V	0	0.1	0.1	V	
			4.5V	0	0.1	0.1	V	
			6.0V	0	0.1	0.1	V	
		$V_{IN} = V_{IH}$ $ I_{OUT}  \leq 4.0 \text{ mA}$ $ I_{OUT}  \leq 5.2 \text{ mA}$	4.5V	0.2	0.26	0.33	0.4	V
			6.0V	0.2	0.26	0.33	0.4	V
$I_{IN}$	Maximum Input Current	$V_{IN} = V_{CC}$ or GND	6.0V		±0.1	±1.0	±1.0	μA
$I_{CC}$	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND $I_{OUT} = 0 \mu A$	6.0V		2.0	20	40	μA

**Note 1:** Absolute Maximum Ratings are those values beyond which damage to the device may occur.

**Note 2:** Unless otherwise specified all voltages are referenced to ground.

**Note 3:** Power Dissipation temperature derating—plastic "N" package: -12 mW/°C from 65°C to 85°C, ceramic "J" package: -12 mW/°C from 100°C to 125°C.

**Note 4:** For a power supply of 5V ± 10% the worst case output voltages ( $V_{OH}$ , and  $V_{OL}$ ) occur for HC at 4.5V. Thus the 4.5V values should be used when designing with this supply. Worst case  $V_{IH}$  and  $V_{IL}$  occur at  $V_{CC} = 5.5V$  and 4.5V respectively. (The  $V_{IH}$  value at 5.5V is 3.85V.) The worst case leakage current ( $I_{IN}$ ,  $I_{CC}$  and  $I_{OZ}$ ) occur for CMOS at the higher voltage and so the 6.0V values should be used.

\*\* $V_{IL}$  limits are currently tested at 20% of  $V_{CC}$ . The above  $V_{IL}$  specification (30% of  $V_{CC}$ ) will be implemented no later than Q1, CY'89.

**AC Electrical Characteristics**  $V_{CC} = 5V, T_A = 25^\circ C, C_L = 15 \text{ pF}, t_r = t_f = 6 \text{ ns}$

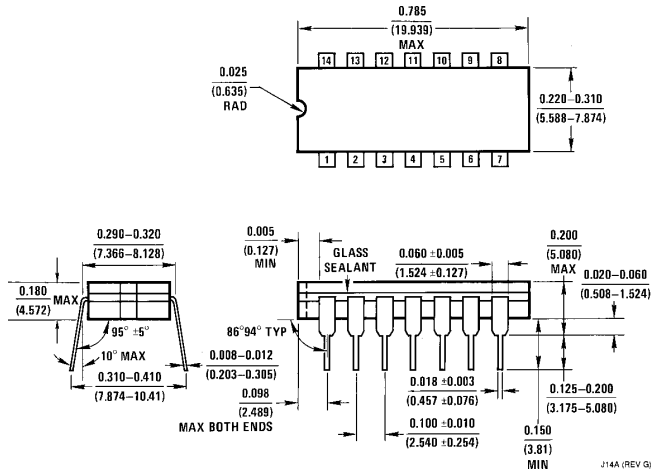
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
$t_{PHL}, t_{PLH}$	Maximum Propagation Delay		10		ns

**AC Electrical Characteristics**  $V_{CC} = 2.0V \text{ to } 6.0V, C_L = 50 \text{ pF}, t_r = t_f = 6 \text{ ns}$  (unless otherwise specified)

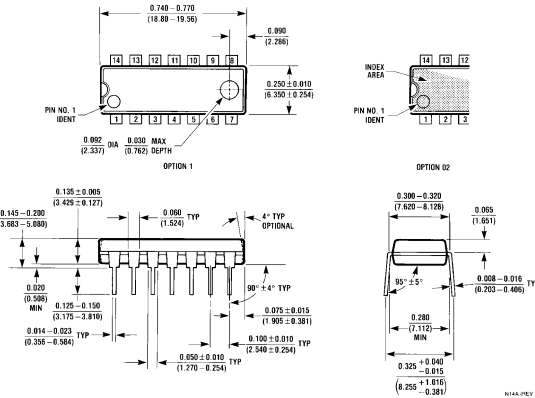
Symbol	Parameter	Conditions	$V_{CC}$	$T_A = 25^\circ C$		$74HC$	$54HC$	Units
						$T_A = -40^\circ C \text{ to } +85^\circ C$	$T_A = -55^\circ C \text{ to } +125^\circ C$	
				Guaranteed Limits				
$t_{PHL}, t_{PLH}$	Minimum Propagation Delay		2.0V	30	80	100	120	ns
			4.5V	10	16	20	24	ns
			6.0V	8	14	17	20	ns
$t_{TLH}, t_{THL}$	Maximum Output Rise and Fall Time		2.0V	50	75	95	110	ns
			4.5V	10	75	19	22	ns
			6.0V	8	13	16	19	ns
$C_{PD}$	Power Dissipation Capacitance (Note 5)	(per gate)		26				pF
$C_{IN}$	Maximum Input Capacitance			5	10	10	10	pF

**Note 5:**  $C_{PD}$  determines the no load dynamic power consumption,  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ , and the no load dynamic current consumption,  $I_S = C_{PD} V_{CC} f + I_{CC}$ .

**Physical Dimensions** inches (millimeters)



**14 Lead Cerdip (J)**  
**Order Number MM54HC34J or MM74HC34J**  
**NS Package Number J14A**



**14 Lead Molded Dip (N)**  
**Order Number MM74HC34N**  
**NS Package Number N14A**

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