

## MM54HCT32/MM74HCT32 Quad 2-Input OR Gate

### General Description

The MM54HCT32/MM74HCT32 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. These devices are input and output characteristic and pin-out compatible with standard DM54LS/74LS logic families. All inputs are protected from static discharge damage by internal diodes to  $V_{CC}$  and ground.

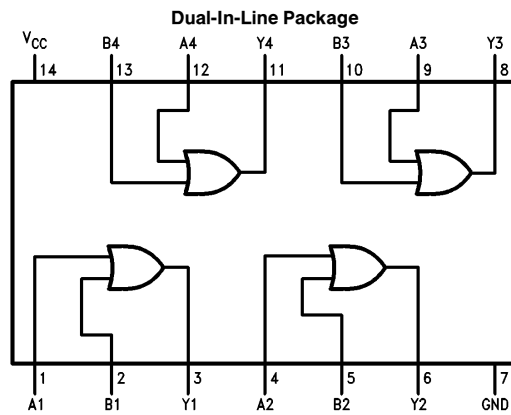
MM54HCT/MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS

devices. These parts are also plug-in replacements for LS-TTL devices and can be used to reduce power consumption in existing designs.

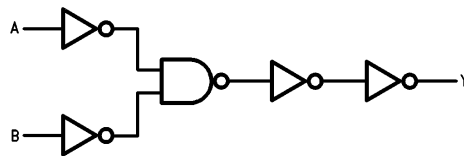
### Features

- TTL, LS pin-out and threshold compatible
- Fast switching:  $t_{PLH}$ ,  $t_{PHL}$  = 10 ns (typ)
- Low power: 10  $\mu$ W at DC
- High fan-out, 10 LS-TTL loads

### Connection and Logic Diagrams



TL/F/9396-1



TL/F/9396-2

## 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 ( $V_{CC}$ )	-0.5 to +7.0V
DC Input Voltage ( $V_{IN}$ )	-1.5 to $V_{CC}$ + 1.5V
DC Output Voltage ( $V_{OUT}$ )	-0.5 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 ( $I_{CC}$ )	±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 ( $V_{CC}$ )	4.5	5.5	V
DC Input or Output Voltage ( $V_{IN}, V_{OUT}$ )	0	$V_{CC}$	V
Operating Temperature Range ( $T_A$ )			
MM74HCT	-40	+85	°C
MM54HCT	-55	+125	°C
Input Rise or Fall Times ( $t_r, t_f$ )		500	ns

## DC Electrical Characteristics $V_{CC} = 5V \pm 10\%$ (unless otherwise specified)

Symbol	Parameter	Conditions	$T_A = 25^\circ\text{C}$			Units	
			Typ	74HCT $T_A = -40^\circ\text{C to } +85^\circ\text{C}$	54HCT $T_A = -55^\circ\text{C to } +125^\circ\text{C}$		
$V_{IH}$	Minimum High Level Input Voltage		2.0	2.0	2.0	V	
$V_{IL}$	Maximum Low Level Input Voltage		0.8	0.8	0.8	V	
$V_{OH}$	Minimum High Level Output Voltage	$V_{IN} = V_{IH}$ or $V_{IL}$ $ I_{OUT}  = 20 \mu\text{A}$ $ I_{OUT}  = 4.0 \text{ mA}, V_{CC} = 4.5\text{V}$ $ I_{OUT}  = 4.8 \text{ mA}, V_{CC} = 5.5\text{V}$	$V_{CC}$ 4.2 5.2	$V_{CC} - 0.1$ 3.98 4.98	$V_{CC} - 0.1$ 3.84 4.84	$V_{CC} - 0.1$ 3.7 4.7	V V V
$V_{OL}$	Maximum Low Level Output Voltage	$V_{IN} = V_{IH}$ $ I_{OUT}  = 20 \mu\text{A}$ $ I_{OUT}  = 4.0 \text{ mA}, V_{CC} = 4.5\text{V}$ $ I_{OUT}  = 4.8 \text{ mA}, V_{CC} = 5.5\text{V}$	0 0.2 0.2	0.1 0.26 0.26	0.1 0.33 0.33	0.1 0.4 0.4	V V V
$I_{IN}$	Maximum Input Current	$V_{IN} = V_{CC}$ or GND, $V_{IH}$ or $V_{IL}$	±0.1	±1.0	±1.0	μA	
$I_{CC}$	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND $I_{OUT} = 0 \mu\text{A}$ $V_{IN} = 2.4\text{V}$ or 0.5V (Note 4)	2.0 1.2	20 1.4	40 1.5	μA mA	

## AC Electrical Characteristics $V_{CC} = 5.0V, t_r = t_f = 6 \text{ ns}, C_L = 15 \text{ pF}, T_A = 25^\circ\text{C}$ (unless otherwise noted)

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

## AC Electrical Characteristics $V_{CC} = 5.0V \pm 10\%, t_r = t_f = 6 \text{ ns}, C_L = 50 \text{ pF}$ (unless otherwise noted)

Symbol	Parameter	Conditions	$T_A = 25^\circ\text{C}$			Units	
			Typ	74HCT $T_A = -40^\circ\text{C to } +85^\circ\text{C}$	54HCT $T_A = -55^\circ\text{C to } +125^\circ\text{C}$		
$t_{PLH}, t_{PHL}$	Maximum Propagation Delay		12	20	25	30	ns
$t_{THL}, t_{TLH}$	Maximum Output Rise & Fall Time		8	15	19	22	ns
$C_{PD}$	Power Dissipation Capacitance	(Note 5)	48				pF
$C_{IN}$	Input Capacitance		5	10	10	10	pF

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

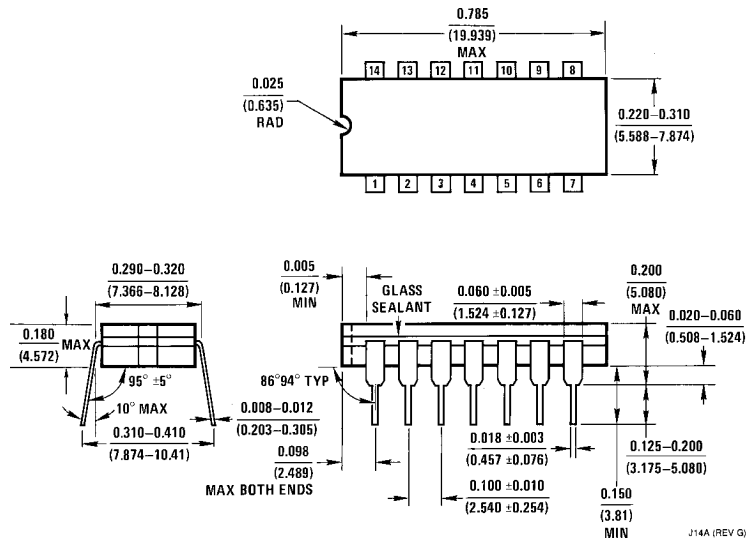
**Note 2:** Unless otherwise specified all voltages are referenced to ground.

**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:** This is measured per input with all other inputs held at  $V_{CC}$  or ground.

**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,  $I_S = C_{PD} V_{CC} f + I_{CC}$ .

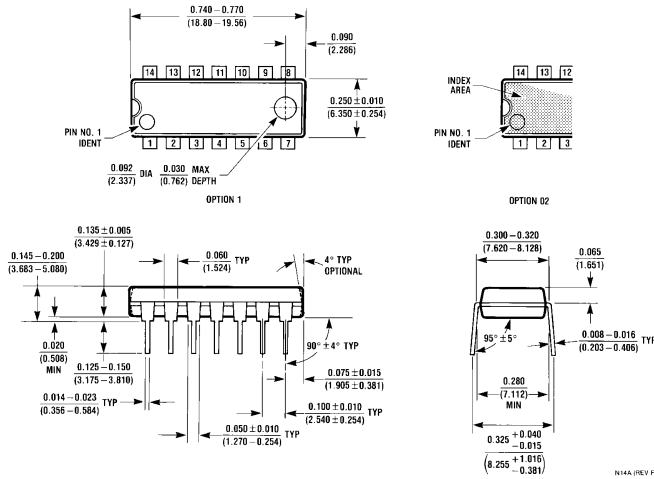
**Physical Dimensions** inches (millimeters)



**Ceramic Dual-In-Line Package (J)**  
**Order Number MM54HCT32J or MM74HCT32J**  
**NS Package Number J14A**

J14A (REV G)

**Physical Dimensions** inches (millimeters) (Continued)



**Molded Dual-In-Line Package (N)**  
**Order Number MM74HCT32N**  
**NS Package Number N14A**

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