

## 74AC10 • 74ACT10 Triple 3-Input NAND Gate

### General Description

The AC/ACT10 contains three, 3-input NAND gates.

### Features

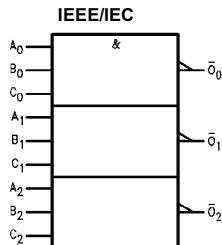
- $I_{CC}$  reduced by 50% on 74AC only
- Outputs source/sink 24 mA

### Ordering Code:

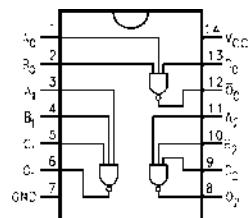
Order Number	Package Number	Package Description
74AC10SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body
74AC10SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC10MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74AC10PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
74ACT10SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body
74ACT10PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

### Logic Symbol



### Connection Diagram



### Pin Descriptions

Pin Names	Description
$A_n, B_n, C_n$	Inputs
$\bar{O}_n$	Outputs

<b>Absolute Maximum Ratings</b> <sup>(Note 1)</sup>		<b>Recommended Operating Conditions</b>				
Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V	Supply Voltage ( $V_{CC}$ )				
DC Input Diode Current ( $I_{IK}$ )		AC	2.0V to 6.0V			
$V_I = -0.5V$	-20 mA	ACT	4.5V to 5.5V			
$V_I = V_{CC} + 0.5V$	+20 mA	Input Voltage ( $V_I$ )	0V to $V_{CC}$			
DC Input Voltage ( $V_I$ )	-0.5V to $V_{CC} + 0.5V$	Output Voltage ( $V_O$ )	0V to $V_{CC}$			
DC Output Diode Current ( $I_{OK}$ )		Operating Temperature ( $T_A$ )	-40°C to +85°C			
$V_O = -0.5V$	-20 mA	Minimum Input Edge Rate ( $\Delta V/\Delta t$ )				
$V_O = V_{CC} + 0.5V$	+20 mA	AC Devices				
DC Output Voltage ( $V_O$ )	-0.5V to $V_{CC} + 0.5V$	$V_{IN}$ from 30% to 70% of $V_{CC}$				
DC Output Source or Sink Current ( $I_O$ )	$\pm 50$ mA	$V_{CC}$ @ 3.3V, 4.5V, 5.5V	125 mV/ns			
DC $V_{CC}$ or Ground Current per Output Pin ( $I_{CC}$ or $I_{GND}$ )	$\pm 50$ mA	Minimum Input Edge Rate ( $\Delta V/\Delta t$ )				
Storage Temperature ( $T_{STG}$ )	-65°C to +150°C	ACT Devices				
Junction Temperature ( $T_J$ )		$V_{IN}$ from 0.8V to 2.0V				
PDIP	140°C	$V_{CC}$ @ 4.5V, 5.5V	125 mV/ns			
<b>Note 1:</b> Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation of circuits outside databook specifications.						
<b>DC Electrical Characteristics for AC</b>						
Symbol	Parameter	$V_{CC}$ (V)	$T_A = +25^\circ C$		Units	Conditions
			Typ	Guaranteed Limits		
$V_{IH}$	Minimum HIGH Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$
	Maximum LOW Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65		
	Minimum HIGH Level Output Voltage	3.0 4.5 5.5	2.99 4.49 5.49	2.9 4.4 5.4		
$V_{IL}$		3.0 4.5 5.5		2.56 3.86 4.86	V	$V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OH} = -12$ mA $I_{OH} = -24$ mA $I_{OH} = -24$ mA (Note 2)
		3.0 4.5 5.5		2.46 3.76 4.76		
$V_{OL}$	Maximum LOW Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	V	$I_{OUT} = 50$ $\mu A$ $V_{IN} = V_{IL}$ or $V_{IH}$ $I_{OL} = 12$ mA $I_{OL} = 24$ mA $I_{OL} = 24$ mA (Note 2)
		3.0 4.5 5.5		0.36 0.36 0.36		
				0.44 0.44 0.44		
$I_{IN}$ (Note 4)	Maximum Input Leakage Current	5.5		$\pm 0.1$	$\mu A$	$V_I = V_{CC}$ or GND
$I_{OLD}$	Minimum Dynamic Output Current (Note 3)	5.5			mA	$V_{OLD} = 1.65V$ Max
$I_{OHD}$		5.5		-75	mA	$V_{OHD} = 3.85V$ Min
$I_{CC}$ (Note 4)	Maximum Quiescent Supply Current	5.5		2.0	20.0	$V_{IN} = V_{CC}$ or GND
<b>Note 2:</b> All outputs loaded; thresholds on input associated with output under test.						
<b>Note 3:</b> Maximum test duration 2.0 ms, one output loaded at a time.						
<b>Note 4:</b> $I_{IN}$ and $I_{CC}$ @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V $V_{CC}$ .						

### DC Electrical Characteristics for ACT

Symbol	Parameter	V <sub>CC</sub> (V)	T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C	Units	Conditions
			Typ	Guaranteed Limits			
V <sub>IH</sub>	Minimum HIGH Level Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1V
		5.5	1.5	2.0	2.0		
V <sub>IL</sub>	Maximum LOW Level Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1V
		5.5	1.5	0.8	0.8		
V <sub>OH</sub>	Minimum HIGH Level Output Voltage	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50 μA
		5.5	5.49	5.4	5.4		
		4.5		3.86	3.76		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OH</sub> = -24 mA I <sub>OH</sub> = -24 mA (Note 5)
V <sub>OL</sub>	Maximum LOW Level Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50 μA
		5.5	0.001	0.1	0.1		
		4.5		0.36	0.44		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> I <sub>OL</sub> = 24 mA I <sub>OL</sub> = 24 mA (Note 5)
V <sub>OL</sub>		5.5		0.36	0.44		
I <sub>IN</sub>	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND
I <sub>CCT</sub>	Maximum I <sub>CC</sub> /Input	5.5	0.6		1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1V
I <sub>OLD</sub>	Minimum Dynamic Output Current (Note 6)	5.5			75	mA	V <sub>OLD</sub> = 1.65V Max
I <sub>OHD</sub>		5.5			-75	mA	V <sub>OHD</sub> = 3.85V Min
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5		4.0	40.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND

Note 5: All outputs loaded; thresholds on input associated with output under test.

Note 6: Maximum test duration 2.0 ms, one output loaded at a time.

### AC Electrical Characteristics for AC

Symbol	Parameter	V <sub>CC</sub> (V) (Note 7)	T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			Units	
			Min		Typ	Max	Min			
			3.3	1.5	6.0	9.5	1.0	10.5		
t <sub>PLH</sub>	Propagation Delay	5.0	1.5	4.5	7.0	1.0	8.0	ns		
t <sub>PHL</sub>	Propagation Delay	3.3	1.5	5.5	8.5	1.0	10.0	ns		
		5.0	1.5	4.0	6.0	1.0	6.5			

Note 7: Voltage Range 3.3 is 3.3V ± 0.3V

Voltage Range 5.0 is 5.0V ± 0.5V

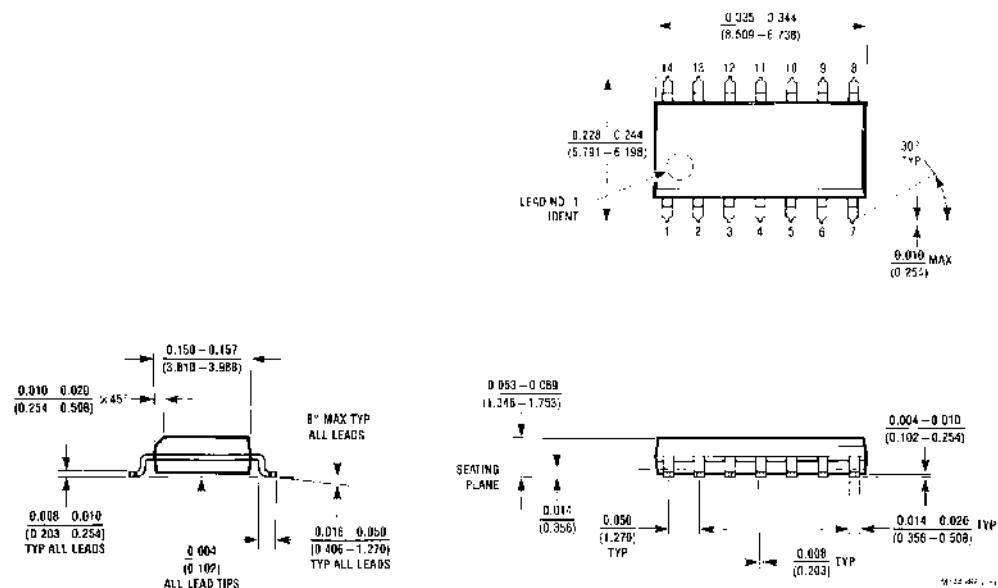
### AC Electrical Characteristics for ACT

Symbol	Parameter	V <sub>CC</sub> (V) (Note 8)	T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			Units	
			Min		Typ	Max	Min			
			5.0	1.0	6.5	9.0	1.0	10.0		
t <sub>PLH</sub>	Propagation Delay	5.0	1.0	6.5	9.0	1.0	10.0	ns		
t <sub>PHL</sub>	Propagation Delay	5.0	1.0	6.5	9.0	1.0	9.5	ns		

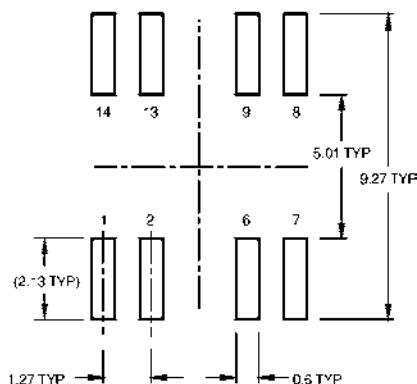
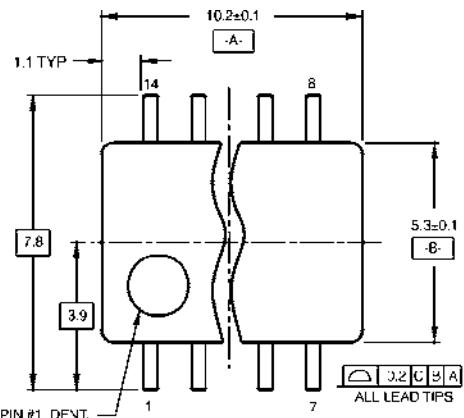
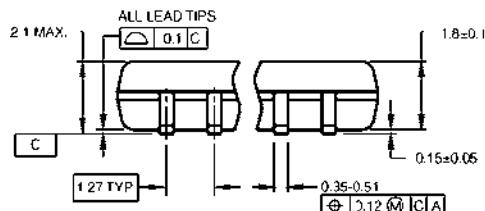
Note 8: Voltage Range 5.0 is 5.0V ± 0.5V

### Capacitance

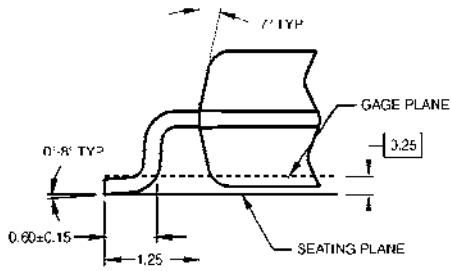
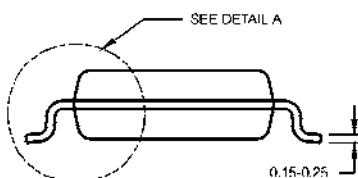
Symbol	Parameter	Typ	Units	Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = OPEN
C <sub>PD</sub>	Power Dissipation Capacitance	25.0	pF	V <sub>CC</sub> = 5.0V

**Physical Dimensions** inches (millimeters) unless otherwise noted

14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body  
Package Number M14A

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)LAND PATTERN RECOMMENDATION

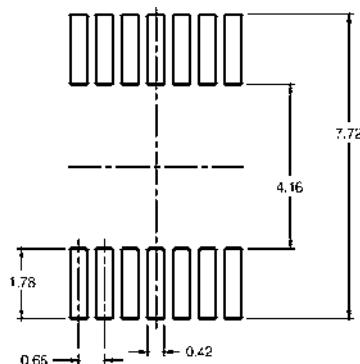
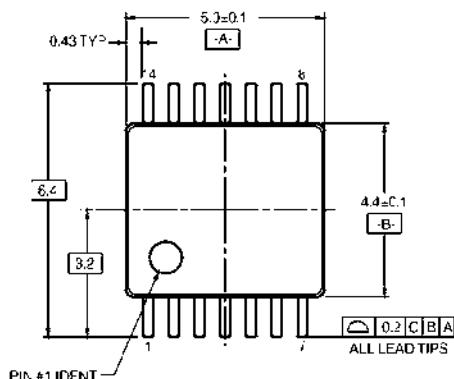
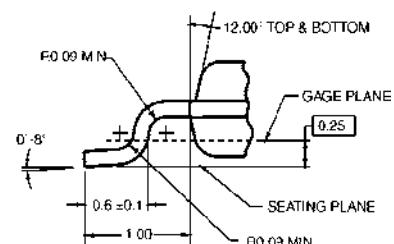
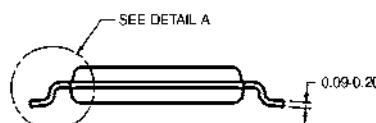
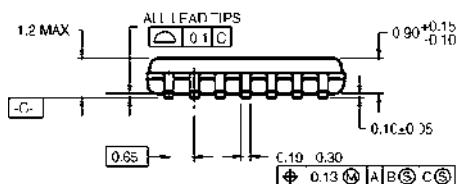
DIMENSIONS ARE IN MILLIMETERS

**NOTES:**

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION.  
ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

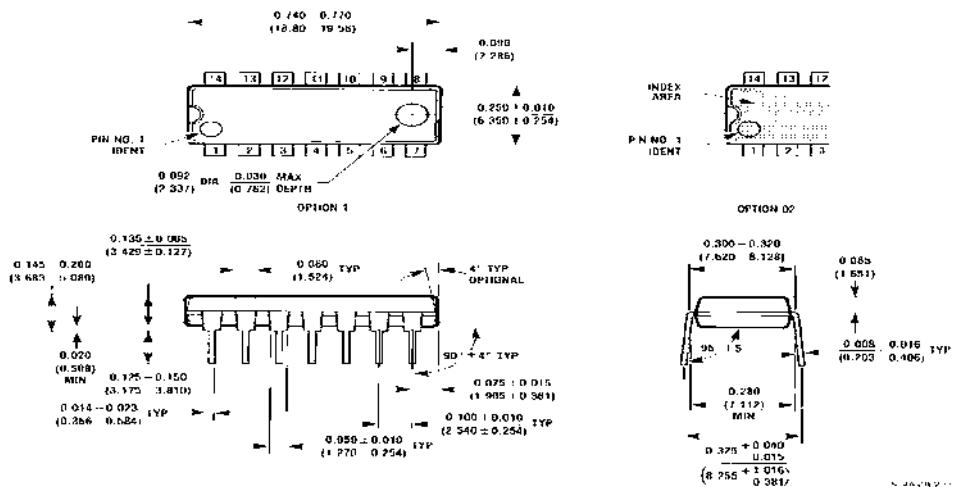
M14DRevB1

**14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide**  
**Package Number M14D**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)AND PATTERN RECOMMENDATIONDETAIL A

**14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide  
Package Number MTC14**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide  
Package Number N14A**

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