

FAIRCHILD
SEMICONDUCTOR™

November 1988
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74AC02•74ACT02 Quad 2-Input NOR Gate

General Description

The AC02/ACT02 contains four, 2-input NOR gates.

Features

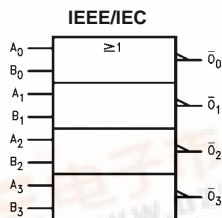
- I_{CC} reduced by 50% on 74AC02 only
- Outputs source/sink 24 mA
- ACT02 has TTL-compatible inputs

Ordering Codes:

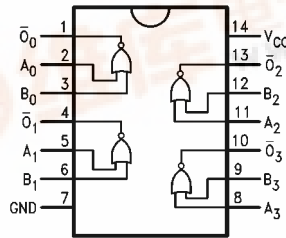
Order Number	Package Number	Package Description
74AC02SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body
74AC02SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC02MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74AC02PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
74ACT02SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow Body
74ACT02MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74ACT02PC	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. (PC not available in Tape and Reel.)

Logic Symbol



Connection Diagram



Pin Descriptions

Pin Names	Description
A _n , B _n	Inputs
O _n	Outputs

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74AC02•74ACT02 Quad 2-Input NOR Gate



Absolute Maximum Ratings(Note 1)

Supply Voltage (V_{CC})	-0.5V to +7.0V
DC Input Diode Current (I_{IK})	
$V_I = -0.5V$	-20 mA
$V_I = V_{CC} + 0.5V$	+20 mA
DC Input Voltage (V_I)	-0.5V to $V_{CC} + 0.5V$
DC Output Diode Current (I_{OK})	
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_O)	-0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current (I_O)	± 50 mA
DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND})	± 50 mA
Storage Temperature (T_{STG})	-65°C to +150°C
Junction Temperature (T_J)	
PDIP	140°C

Recommended Operating Conditions

Supply Voltage (V_{CC})	
AC	2.0V to 6.0V
ACT	4.5V to 5.5V
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	-40°C to +85°C
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
AC Devices	
V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.3V, 4.5V, 5.5V	125 mV/ns
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
ACT Devices	
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 4.5V, 5.5V	125 mV/ns

Note 1: 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 FACT™ circuits outside databook specifications.

DC Electrical Characteristics for AC

Symbol	Parameter	V_{CC} (V)	$T_A = +25^\circ\text{C}$		$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Units	Conditions
			Typ	Guaranteed Limits				
V_{IH}	Minimum HIGH Level Input Voltage	3.0	1.5	2.1	2.1	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	2.25	3.15	3.15			
		5.5	2.75	3.85	3.85			
V_{IL}	Maximum LOW Level Input Voltage	3.0	1.5	0.9	0.9	V	$V_{OUT} = 0.1V$ or $V_{CC} - 0.1V$	
		4.5	2.25	1.35	1.35			
		5.5	2.75	1.65	1.65			
V_{OH}	Minimum HIGH Level Output Voltage	3.0	2.99	2.9	2.9	V	$I_{OUT} = -50 \mu A$	
		4.5	4.49	4.4	4.4			
		5.5	5.49	5.4	5.4			
			3.0		2.56	2.46	V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ (Note 2)
			4.5		3.86	3.76		
			5.5		4.86	4.76		
V_{OL}	Maximum LOW Level Output Voltage	3.0	0.002	0.1	0.1	V	$I_{OUT} = 50 \mu A$	
		4.5	0.001	0.1	0.1			
		5.5	0.001	0.1	0.1			
			3.0		0.36	0.44	V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ (Note 2)
			4.5		0.36	0.44		
			5.5		0.36	0.44		
I_{IN} (Note 4)	Maximum Input Leakage Current	5.5		± 0.1	± 1.0	μA	$V_I = V_{CC}, GND$	
I_{OLD}	Minimum Dynamic	5.5			75	mA	$V_{OLD} = 1.65V$ Max	
I_{OHD}	Output Current (Note 3)	5.5			-75	mA	$V_{OHD} = 3.85V$ Min	
I_{CC} (Note 4)	Maximum Quiescent Supply Current	5.5		2.0	20.0	μA	$V_{IN} = V_{CC}$ or GND	

Note 2: All outputs loaded; thresholds on input associated with output under test.

Note 3: Maximum test duration 2.0 ms, one output loaded at a time.

Note 4: 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 _{CC} (V)	T _A = +25°C		T _A = -40°C to +85°C	Units	Conditions	
			Typ	Guaranteed Limits				
V _{IH}	Minimum HIGH Level Input Voltage	4.5	1.5	2.0	2.0	V	V _{OUT} = 0.1V or V _{CC} - 0.1V	
		5.5	1.5	2.0	2.0			
V _{IL}	Maximum LOW Level Input Voltage	4.5	1.5	0.8	0.8	V	V _{OUT} = 0.1V or V _{CC} - 0.1V	
		5.5	1.5	0.8	0.8			
V _{OH}	Minimum HIGH Level Output Voltage	4.5	4.49	4.4	4.4	V	I _{OUT} = -50 μA	
		5.5	5.49	5.4	5.4			
			4.5		3.86	3.76	V	V _{IN} = V _{IL} or V _{IH} I _{OH} = -24 mA I _{OH} = -24 mA (Note 5)
			5.5		4.86	4.76		
V _{OL}	Maximum LOW Level Output Voltage	4.5	0.001	0.1	0.1	V	I _{OUT} = 50 μA	
		5.5	0.001	0.1	0.1			
			4.5		0.36	0.44	V	V _{IN} = V _{IL} or V _{IH} I _{OL} = 24 mA I _{OL} = 24 mA (Note 5)
			5.5		0.36	0.44		
I _{IN}	Maximum Input Leakage Current	5.5		±0.1	±1.0	μA	V _I = V _{CC} , GND	
I _{CC} T	Maximum I _{CC} /Input	5.5	0.6		1.5	mA	V _I = V _{CC} - 2.1V	
I _{OLD}	Minimum Dynamic	5.5			75	mA	V _{OLD} = 1.65V Max	
I _{OHD}	Output Current (Note 6)	5.5			-75	mA	V _{OHD} = 3.85V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5		4.0	40.0	μA	V _{IN} = V _{CC} 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 _{CC} (V) (Note 7)	T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		Units
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay	3.3	1.5	5.0	7.5	1.0	8.0	ns
		5.0	1.5	4.0	6.0	1.0	6.5	
t _{PHL}	Propagation Delay	3.3	1.5	5.0	7.5	1.0	8.0	ns
		5.0	1.5	4.5	6.5	1.0	7.0	

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 _{CC} (V) (Note 8)	T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		Units
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay	5.0	1.0	6.0	8.5	1.0	9.0	ns
t _{PHL}	Propagation Delay	5.0	1.0	6.5	9.5	1.0	10.0	ns

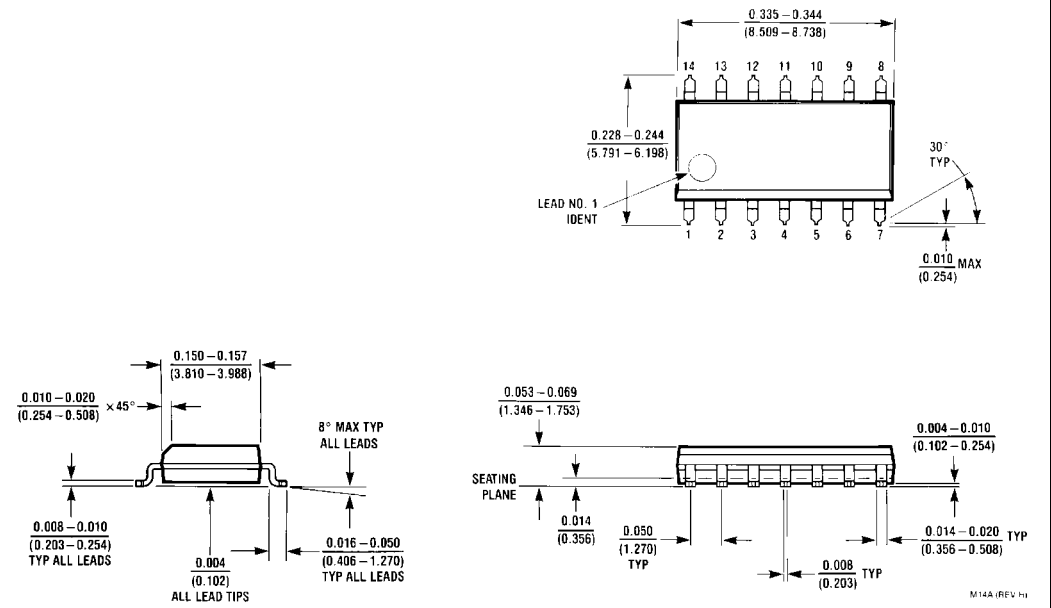
Note 8: Voltage Range 5.0 is 5.0V ± 0.5V

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = OPEN
C _{PD}	Power Dissipation Capacitance	30.0	pF	V _{CC} = 5.0V



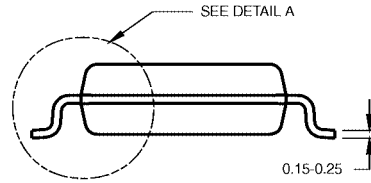
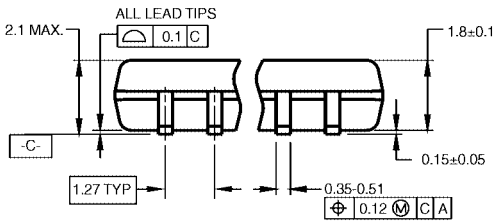
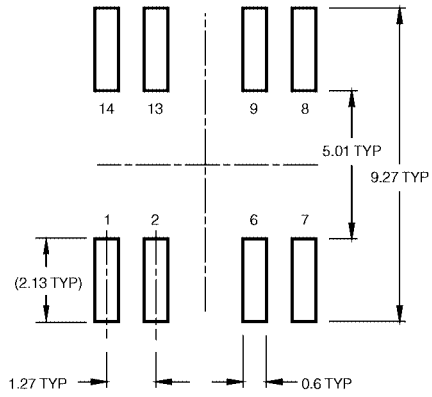
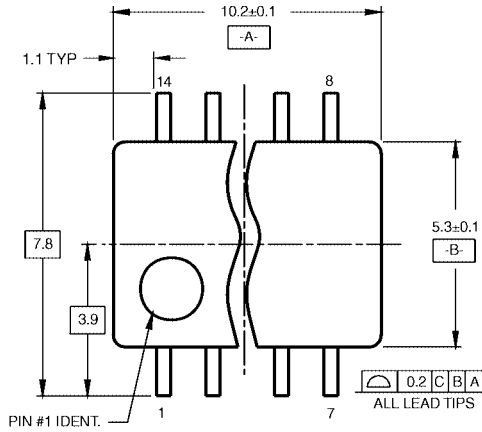
Physical Dimensions inches (millimeters) unless otherwise noted



**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)

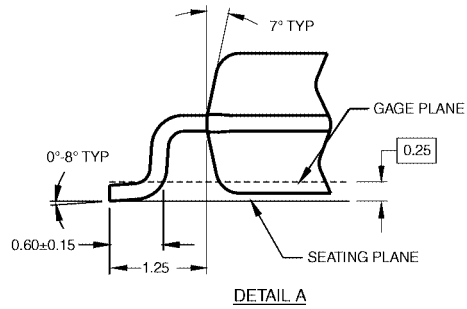


DIMENSIONS ARE IN MILLIMETERS

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.

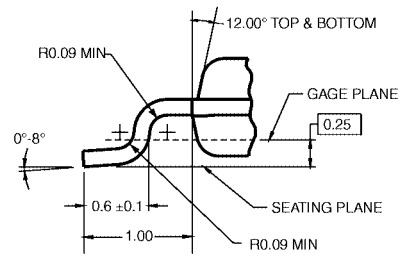
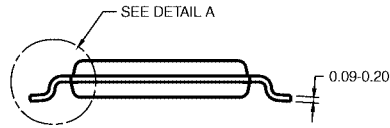
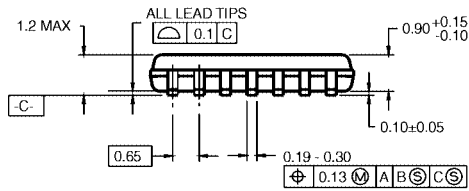
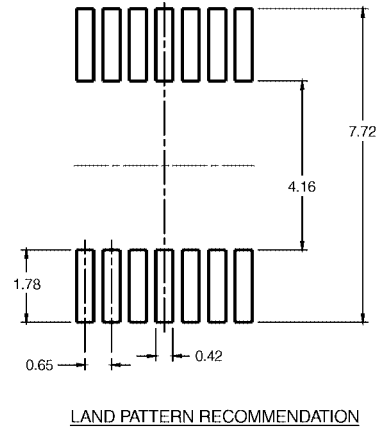
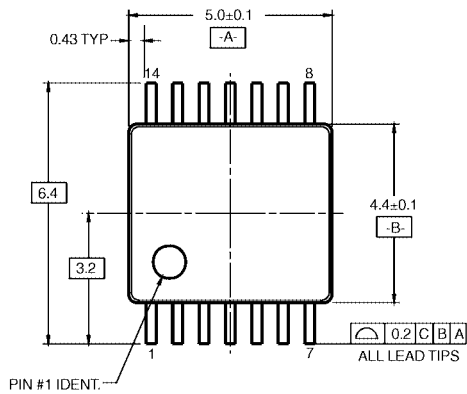
M14DRevB1



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



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



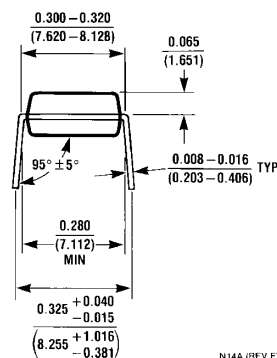
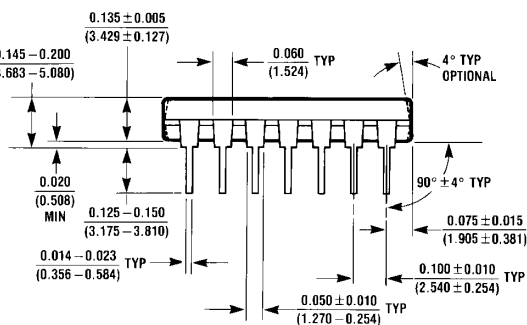
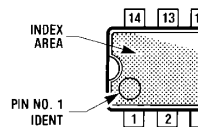
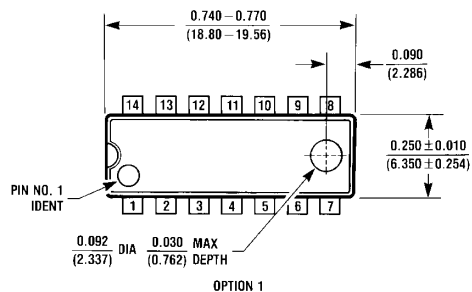
- NOTES:
- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6, DATE 7/93.
 - B. DIMENSIONS ARE IN MILLIMETERS.
 - C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
 - D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MTC14RevC3

DETAIL 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)



N14A (REV F)

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

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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