74AC00, 74ACT00 — Quad 2-Input NAND Gate



# 74AC00, 74ACT00 Quad 2-Input NAND Gate

### Features

- I<sub>CC</sub> reduced by 50%
- Outputs source/sink 24mA
- ACT00 has TTL-compatible inputs

### **General Description**

The AC00/ACT00 contains four, 2-input NAND gates.

Order Number	Package Number	Package Description
74AC00SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74AC00SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74AC00MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74AC00PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
74ACT00SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74ACT00SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74ACT00MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74ACT00PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

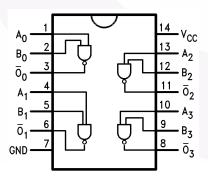
#### **Ordering Information**

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

All packages are lead free per JEDEC: J-STD-020B standard.

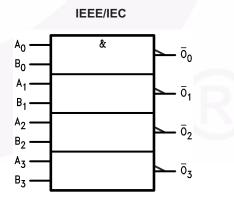
### **Connection Diagram**

### Logic Symbol



# **Pin Description**

Pin Names	Description
A <sub>n</sub> , B <sub>n</sub>	Inputs
Ō <sub>n</sub>	Outputs



### **Absolute Maximum Ratings**

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating
V <sub>CC</sub>	Supply Voltage	-0.5V to +7.0V
I <sub>IK</sub>	DC Input Diode Current	
	$V_{I} = -0.5V$	–20mA
	V <sub>I</sub> = V <sub>CC</sub> + 0.5	+20mA
VI	DC Input Voltage	-0.5V to V <sub>CC</sub> + 0.5V
I <sub>ОК</sub>	DC Output Diode Current	
	$V_{O} = -0.5V$	–20mA
	$V_{\rm O} = V_{\rm CC} + 0.5 V$	+20mA
Vo	DC Output Voltage	-0.5V to V <sub>CC</sub> + 0.5V
Ι <sub>Ο</sub>	DC Output Source or Sink Current	±50mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current per Output Pin	±50mA
T <sub>STG</sub>	Storage Temperature	–65°C to +150°C
TJ	Junction Temperature	140°C

### **Recommended Operating Conditions**

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Rating
V <sub>CC</sub>	Supply Voltage	
	AC	2.0V to 6.0V
	ACT	4.5V to 5.5V
VI	Input Voltage	0V to V <sub>CC</sub>
Vo	Output Voltage	0V to V <sub>CC</sub>
T <sub>A</sub>	Operating Temperature	-40°C to +85°C
$\Delta V / \Delta t$	Minimum Input Edge Rate, AC Devices:	125mV/ns
	$V_{\rm IN}$ from 30% to 70% of $V_{\rm CC}, V_{\rm CC}$ @ 3.3V, 4.5V, 5.5V	
$\Delta V / \Delta t$	Minimum Input Edge Rate, ACT Devices:	125mV/ns
	V <sub>IN</sub> from 0.8V to 2.0V, V <sub>CC</sub> @ 4.5V, 5.5V	

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# **DC Electrical Characteristics for AC**

		V <sub>cc</sub>		$T_A = 1$	⊦25°C	$T_{A} = -40^{\circ}C \text{ to } +85^{\circ}C$	
Symbol	Parameter	(V)	Conditions	Тур.	G	uaranteed Limits	Units
V <sub>IH</sub>	Minimum HIGH Level	3.0	$V_{OUT} = 0.1V$	1.5	2.1	2.1	V
	Input Voltage	4.5	or V <sub>CC</sub> – 0.1V	2.25	3.15	3.15	1
		5.5		2.75	3.85	3.85	1
V <sub>IL</sub>	Maximum LOW Level	3.0	$V_{OUT} = 0.1V$	1.5	0.9	0.9	V
	Input Voltage	4.5	or V <sub>CC</sub> – 0.1V	2.25	1.35	1.35	1
		5.5	-	2.75	1.65	1.65	1
V <sub>OH</sub>	Minimum HIGH Level	3.0	Ι <sub>ΟUT</sub> = –50μΑ	2.99	2.9	2.9	V
	Output Voltage	4.5		4.49	4.4	4.4	1
		5.5		5.49	5.4	5.4	1
		3.0	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = -12 \text{mA}$		2.56	2.46	
		4.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = -24 \text{mA}$		3.86	3.76	-
		5.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = -24 \text{mA}^{(1)}$		4.86	4.76	
V <sub>OL</sub>	Maximum LOW Level	3.0	Ι <sub>ΟUT</sub> = 50μΑ	0.002	0.1	0.1	V
	Output Voltage	4.5	-	0.001	0.1	0.1	1
		5.5		0.001	0.1	0.1	1
		3.0	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 12 \text{mA}$		0.36	0.44	
		4.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24 \text{mA}$		0.36	0.44	
		5.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24 \text{mA}^{(1)}$		0.36	0.44	
I <sub>IN</sub> <sup>(3)</sup>	Maximum Input Leakage Current	5.5	$V_{I} = V_{CC}$ , GND		±0.1	±1.0	μA
I <sub>OLD</sub>	Minimum Dynamic	5.5	V <sub>OLD</sub> = 1.65V Max.			75	mA
I <sub>OHD</sub>	Output Current <sup>(2)</sup>	5.5	V <sub>OHD</sub> = 3.85V Min.			-75	mA
I <sub>CC</sub> <sup>(3)</sup>	Maximum Quiescent Supply Current	5.5	$V_{IN} = V_{CC}$ or GND		2.0	20.0	μA

#### Notes:

1. All outputs loaded; thresholds on input associated with output under test.

2. Maximum test duration 2.0ms, one output loaded at a time.

3.  $I_{\rm IN}$  and  $I_{\rm CC}$  @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V  $V_{\rm CC}.$ 

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# **DC Electrical Characteristics for ACT**

		V <sub>cc</sub>		$T_A = H$	-25°C	T <sub>A</sub> = -40°C to +85°C	
Symbol	Parameter	(V)	Conditions	Тур.	G	Juaranteed Limits	Units
V <sub>IH</sub>	Minimum HIGH Level	4.5	$V_{OUT} = 0.1V$ or	1.5	2.0	2.0	V
	Input Voltage		V <sub>CC</sub> – 0.1V	1.5	2.0	2.0	1
V <sub>IL</sub>	Maximum LOW Level	4.5	$V_{OUT} = 0.1V$ or	1.5	0.8	0.8	V
	Input Voltage	5.5	V <sub>CC</sub> – 0.1V	1.5	0.8	0.8	1
V <sub>OH</sub>	Minimum HIGH Level	4.5	$I_{OUT} = -50 \mu A$	4.49	4.4	4.4	V
	Output Voltage	5.5	-	5.49	5.4	5.4	1
		4.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = -24 \text{mA}$		3.86	3.76	
		5.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OH} = -24 \text{mA}^{(4)}$		4.86	4.76	
V <sub>OL</sub>	Maximum LOW Level	4.5	$I_{OUT} = 50 \mu A$	0.001	0.1	0.1	V
	Output Voltage	5.5	-	0.001	0.1	0.1	]
		4.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24 \text{mA}$		0.36	0.44	
		5.5	$V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24 \text{mA}^{(4)}$		0.36	0.44	
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	$V_I = V_{CC}$ , GND		±0.1	±1.0	μA
I <sub>CCT</sub>	Maximum I <sub>CC</sub> /Input	5.5	$V_{I} = V_{CC} - 2.1V$	0.6		1.5	mA
I <sub>OLD</sub>	Minimum Dynamic	5.5	V <sub>OLD</sub> = 1.65V Max.			75	mA
I <sub>OHD</sub>	Output Current <sup>(5)</sup> 5.5		V <sub>OHD</sub> = 3.85V Min.			-75	mA
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	$V_{IN} = V_{CC}$ or GND		2.0	20.0	μA

#### Notes:

4. All outputs loaded; thresholds on input associated with output under test.

5. Maximum test duration 2.0ms, one output loaded at a time.

# **AC Electrical Characteristics for AC**

			T <sub>A</sub> C	_ = +25° ⊢_ = 50p	Ċ, F	$\begin{vmatrix} T_{A} = -40^{\circ}C \\ C_{L} = \end{vmatrix}$	c to +85°C, 50pF	
Symbol	Parameter	V <sub>CC</sub> (V) <sup>(6)</sup>	Min.	Тур.	Max.	Min.	Max.	Units
t <sub>PLH</sub>	Propagation Delay	3.3	2.0	7.0	9.5	2.0	10.0	ns
		5.0	1.5	6.0	8.0	1.5	8.5	
t <sub>PHL</sub>	Propagation Delay	3.3	1.5	5.5	8.0	1.0	8.5	ns
		5.0	1.5	4.5	6.5	1.0	7.0	

#### Note:

6. Voltage range 3.3 is 3.3V  $\pm$  0.3V. Voltage range 5.0 is 5.0V  $\pm$  0.5V.

# AC Electrical Characteristics for ACT

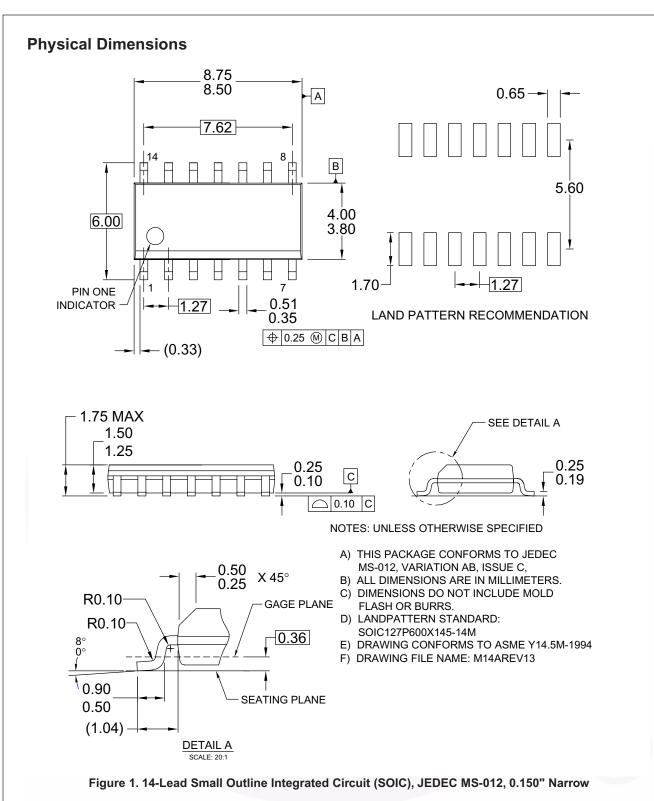
				λ = +25° 3 <sub>L</sub> = 50p		$T_A = -40^{\circ}C$ $C_L =$	to +85°C, 50pF	
Symbol	Parameter	V <sub>CC</sub> (V) <sup>(7)</sup>	Min.	Тур.	Max.	Min.	Max.	Units
t <sub>PLH</sub>	Propagation Delay	5.0	1.5	5.5	9.0	1.0	9.5	ns
t <sub>PHL</sub>	Propagation Delay	5.0	1.5	4.0	7.0	1.0	8.0	ns

#### Note:

7. Voltage Range 5.0 is  $5.0V \pm 0.5V$ .

# Capacitance

Symbol	Parameter	Conditions	Тур.	Units
C <sub>IN</sub>	Input Capacitance	V <sub>CC</sub> = OPEN	4.5	pF
C <sub>PD</sub>	Power Dissipation Capacitance	$V_{CC} = 5.0V$	30.0	pF

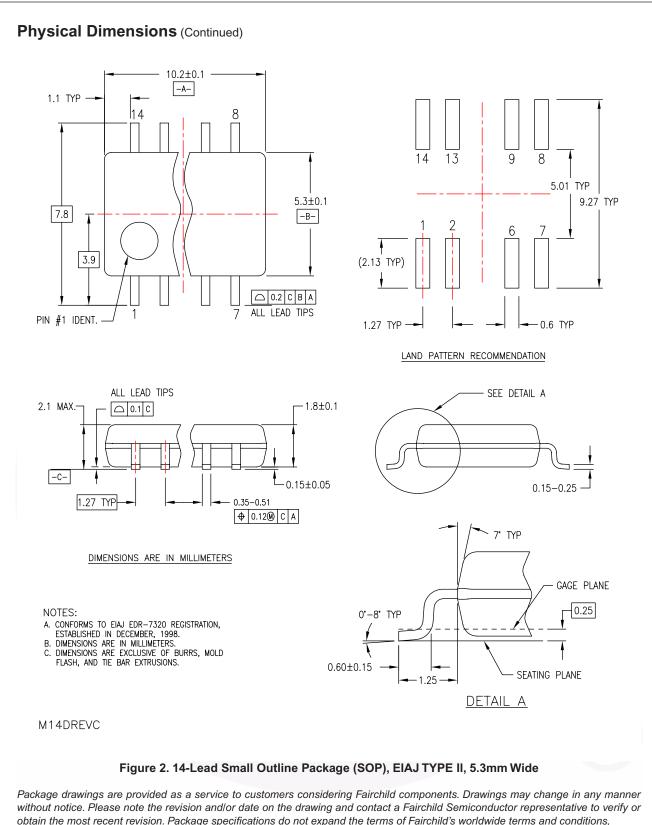


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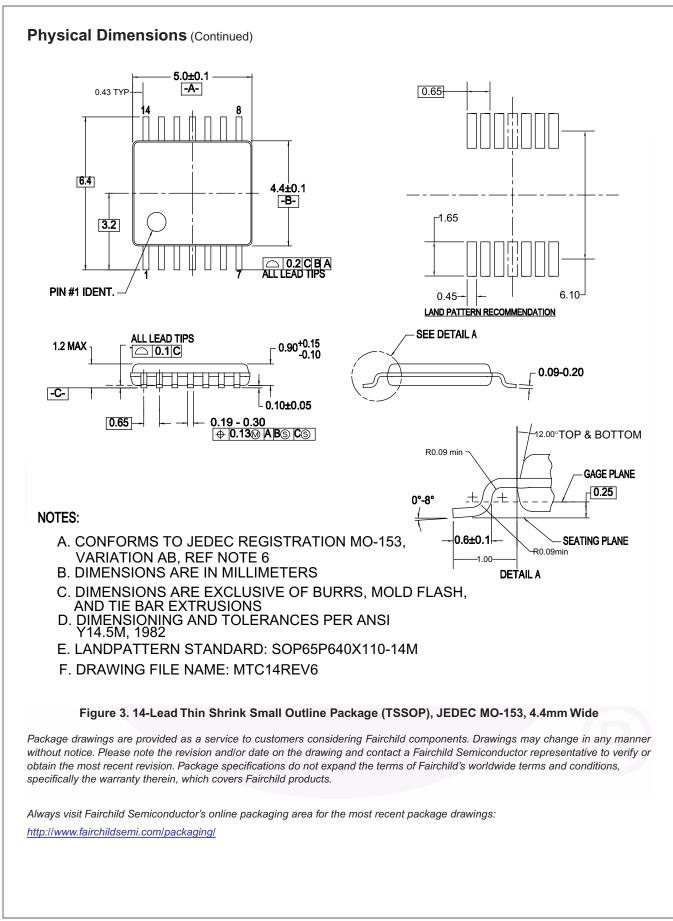


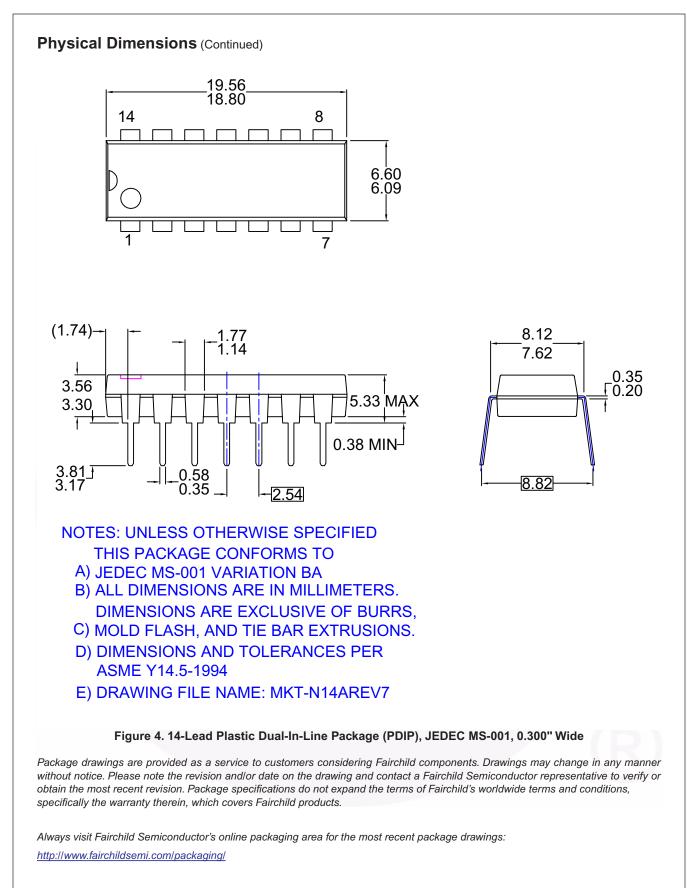


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