

54AC00/54ACT00 Quad 2-Input NAND Gate

Check for Samples: [54AC00](#), [54ACT00](#)

FEATURES

- I_{CC} Reduced by 50%
- Outputs Source/Sink 24 mA
- 'ACT00 has TTL-Compatible Inputs
- Standard Microcircuit Drawing (SMD)
 - 'AC00: 5962-87549
 - 'ACT00: 5962-87699
- 54AC00 now Qualified to 300Krad RHA Designation, Refer to the SMD for More Information

DESCRIPTION

The 'AC/'ACT00 contains four 2-input NAND gates.

Logic Symbol

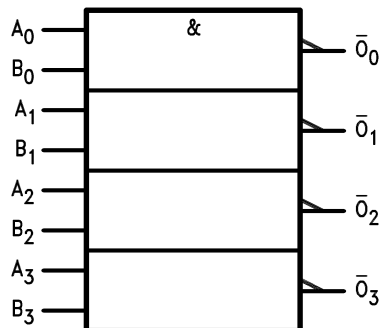


Figure 1. IEEE/IEC

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



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Connection Diagrams

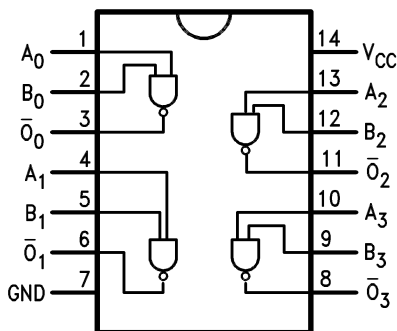


Figure 2. Pin Assignment for CDIP and CLGA

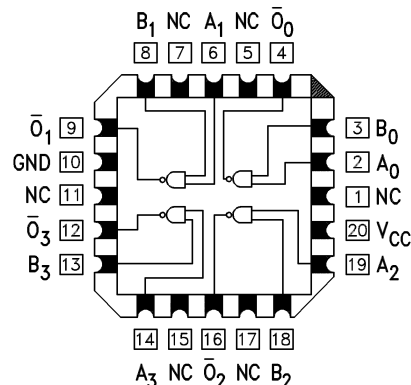


Figure 3. Pin Assignment for LCCC



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings⁽¹⁾⁽²⁾

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)	CDIP	175°C

- (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. TI does not recommend operation of FACT[®] circuits outside databook specifications.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/ Distributors for availability and specifications.

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)	54AC/ACT	-55°C to +125°C
Minimum Input Edge Rate ($\Delta V/\Delta t$) 'AC Devices	V_{IN} from 30% to 70% of V_{CC}	125 mV/ns
	V_{CC} @ 3.3V, 4.5V, 5.5V	
Minimum Input Edge Rate ($\Delta V/\Delta t$) 'ACT Devices	V_{IN} from 0.8V to 2.0V	125 mV/ns
	V_{CC} @ 4.5V, 5.5V	

DC Characteristics for 'AC Family Devices

Symbol	Parameter	V _{CC} (V)	54AC		Units	Conditions	
			T _A = -55°C to +125°C				
			Ensured Limits				
V _{IH}	Minimum High Level Input Voltage	3.0	2.1		V	V _{OUT} = 0.1V or V _{CC} - 0.1V	
		4.5	3.15				
		5.5	3.85				
V _{IL}	Maximum Low Level Input Voltage	3.0	0.9		V	V _{OUT} = 0.1V or V _{CC} - 0.1V	
		4.5	1.35				
		5.5	1.65				
V _{OH}	Minimum High Level Output Voltage	3.0	2.9		V	I _{OUT} = -50 μA	
		4.5	4.4				
		5.5	5.4				
			3.0	2.4		V	See ⁽¹⁾ V _{IN} = V _{IL} or V _{IH} I _{OH} = -12 mA I _{OH} = -24 mA I _{OH} = -24 mA
			4.5	3.7			
			5.5	4.7			
V _{OL}	Maximum Low Level Output Voltage	3.0	0.1		V	I _{OUT} = 50 μA	
		4.5	0.1				
		5.5	0.1				
			3.0	0.5		V	See ⁽²⁾ V _{IN} = V _{IL} or V _{IH} I _{OL} = 12 mA I _{OL} = 24 mA I _{OL} = 24 mA
			4.5	0.5			
			5.5	0.5			
I _{IN}	Maximum Input Leakage Current	5.5	±1.0		μA	V _I = V _{CC} , GND	
I _{OLD}	Minimum Dynamic Output Current ⁽³⁾	5.5	50		mA	V _{OLD} = 1.65V Max	
I _{OHD}		5.5	-50		mA	V _{OHD} = 3.85V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5	40.0		μA	V _{IN} = V _{CC} or GND	

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

(2) All outputs loaded; thresholds on input associated with output under test.

(3) Maximum test duration 2.0 ms, one output loaded at a time.

DC Characteristics for 'ACT Family Devices

Symbol	Parameter	V _{CC} (V)	54ACT		Units	Conditions
			T _A = –55°C to +125°C			
			Ensured Limits			
V _{IH}	Minimum High Level Input Voltage	4.5	2.0		V	V _{OUT} = 0.1V or V _{CC} – 0.1V
		5.5	2.0			
V _{IL}	Maximum Low Level Input Voltage	4.5	0.8		V	V _{OUT} = 0.1V or V _{CC} – 0.1V
		5.5	0.8			
V _{OH}	Minimum High Level Output Voltage	4.5	4.4		V	I _{OUT} = –50 μA
		5.5	5.4			
		4.5	3.70		V	See ⁽¹⁾ V _{IN} = V _{IL} or V _{IH} I _{OH} = –24 mA I _{OH} = –24 mA
		5.5	4.70			
V _{OL}	Maximum Low Level Output Voltage	4.5	0.1		V	I _{OUT} = 50 μA
		5.5	0.1			
		4.5	0.50		V	See ⁽¹⁾ V _{IN} = V _{IL} or V _{IH} I _{OL} = 24 mA I _{OL} = 24 mA
		5.5	0.50			
I _{IN}	Maximum Input Leakage Current	5.5	±1.0		μA	V _I = V _{CC} , GND
I _{CCT}	Maximum I _{CC} /Input	5.5	1.6		mA	V _I = V _{CC} – 2.1V
I _{OLD}	Minimum Dynamic Output Current ⁽²⁾	5.5	50		mA	V _{OLD} = 1.65V Max
I _{OHD}		5.5	–50		mA	V _{OHD} = 3.85V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	40.0		μA	V _{IN} = V _{CC} or GND

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

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

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) ⁽¹⁾	54AC		Units	Fig. No.
			T _A = -55°C to +125°C C _L = 50 pF			
			Min	Max		
t _{PLH}	Propagation Delay	3.3	1.0	11.0	ns	
		5.0	1.5	8.5		
t _{PHL}	Propagation Delay	3.3	1.0	9.0	ns	
		5.0	1.5	7.0		

(1) Voltage Range 3.3 is 3.3V ±0.3V.
Voltage Range 5.0 is 5.0V ±0.5V.

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) ⁽¹⁾	54ACT		Units	Fig. No.
			T _A = -55°C to +125°C C _L = 50 pF			
			Min	Max		
t _{PLH}	Propagation Delay	5.0	1.5	9.5	ns	
t _{PHL}	Propagation Delay	5.0	1.5	8.0	ns	

(1) Voltage Range 5.0 is 5.0V ±0.5V.

Table 1. 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

REVISION HISTORY

Changes from Revision A (April 2013) to Revision B	Page
• Changed layout of National Data Sheet to TI format	5

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