54AC00/54ACT00 Quad 2-Input NAND Gate

Check for Samples: 54AC00, 54ACT00

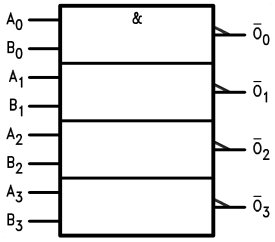
FEATURES

- **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.

Figure 1. IEEE/IEC



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

Connection Diagram

Figure 2. Pin Assignment for DIP and Flatpak

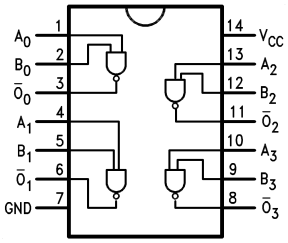
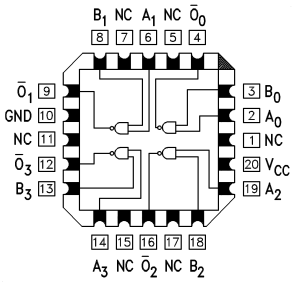


Figure 3. Pin Assignment for LCC



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)

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. National does not recommend operation of FACT® circuits outside databook specifications.

Recommended OperatingConditions

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 (ΔV/Δt)	
'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 (ΔV/Δt)	
'ACT Devices	
V_{IN} from 0.8V to 2.0V	

Recommended OperatingConditions (continued)

V_{CC} @ 4.5V, 5.5V	125 mV/ns

DC Characteristics for 'AC Family Devices

			54AC		
Symbol	**Parameter**	**V_{CC}**	**T_A =**	**Units**	**Conditions**
		(V)	**−55°C to +125°C**		
			Guaranteed Limits		
V_{IH}	Minimum High Level	3.0	2.1		V_{OUT} = 0.1V
	Input Voltage	4.5	3.15	V	or V_{CC} − 0.1V
		5.5	3.85		
V_{IL}	Maximum Low Level	3.0	0.9		V_{OUT} = 0.1V
	Input Voltage	4.5	1.35	V	or V_{CC} − 0.1V
		5.5	1.65		
V_{OH}	Minimum High Level	3.0	2.9		I_{OUT} = −50 µA
	Output Voltage	4.5	4.4	V	
		5.5	5.4		
					(1) V_{IN} = V_{IL} or V_{IH}
		3.0	2.4		I_{OH} = −12 mA
		4.5	3.7	V	I_{OH} = −24 mA
		5.5	4.7		I_{OH} = −24 mA
V_{OL}	Maximum Low Level	3.0	0.1		I_{OUT} = 50 µA
	Output Voltage	4.5	0.1	V	
		5.5	0.1		
					(1) V_{IN} = V_{IL} or V_{IH}
		3.0	0.5		I_{OL} = 12 mA
		4.5	0.5	V	I_{OL} = 24 mA
		5.5	0.5		I_{OL} = 24 mA
I_{IN}	Maximum Input	5.5	±1.0	µA	V_I = V_{CC}, GND
	Leakage Current				
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	5.5	40.0	µA	V_{IN} = V_{CC}
	Supply Current				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.

DC Characteristics for 'ACT Family Devices

			54ACT		
Symbol	**Parameter**	**V_{CC}**	**T_A =**	**Units**	**Conditions**
		(V)	**−55°C to +125°C**		
			Guaranteed Limits		
V_{IH}	Minimum High Level	4.5	2.0	V	V_{OUT} = 0.1V
	Input Voltage	5.5	2.0		or V_{CC} − 0.1V
V_{IL}	Maximum Low Level	4.5	0.8	V	V_{OUT} = 0.1V
	Input Voltage	5.5	0.8		or V_{CC} − 0.1V
V_{OH}	Minimum High Level	4.5	4.4	V	I_{OUT} = −50 µA
	Output Voltage	5.5	5.4		
					(1) V_{IN} = V_{IL} or V_{IH}
		4.5	3.70	V	I_{OH} = −24 mA
		5.5	4.70		I_{OH} = −24 mA
V_{OL}	Maximum Low Level	4.5	0.1	V	I_{OUT} = 50 µA
	Output Voltage	5.5	0.1		
					(1) V_{IN} = V_{IL} or V_{IH}
		4.5	0.50	V	I_{OL} = 24 mA
		5.5	0.50		I_{OL} = 24 mA
I_{IN}	Maximum Input	5.5	±1.0	µA	V_I = V_{CC}, GND
	Leakage Current				
I_{CCT}	Maximum	5.5	1.6	mA	V_I = V_{CC} − 2.1V
	I_{CC}/Input				
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	5.5	40.0	µA	V_{IN} = V_{CC}
	Supply Current				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

			54AC			
		V_{CC}	T_A = −55°C			Fig.
Symbol	Parameter	(V)	to +125°C		Units	No.
		(1)	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 ±0.3VVoltage Range 5.0 is 5.0V ±0.5V

AC Electrical Characteristics

			54ACT			
		V_{CC}	T_A = −55°C			Fig.
Symbol	Parameter	(V)	to +125°C		Units	No.
		(1)	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

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = Open
C_{PD}	Power Dissipation	30.0	pF	V_{CC} = 5.0V
	Capacitance			

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