

Data sheet acquired from Harris Semiconductor

January 1998 - Revised September 2003

CD54HC00, CD74HC00, CD54HCT00, CD74HCT00

High-Speed CMOS Logic Quad 2-Input NAND Gate

Features

- · Buffered Inputs
- Typical Propagation Delay: 7ns at $V_{CC} = 5V$, $C_L = 15pF, T_A = 25^{o}C$
- Fanout (Over Temperature Range)
 - Standard Outputs........... 10 LSTTL Loads - Bus Driver Outputs 15 LSTTL Loads
- Wide Operating Temperature Range . . . -55°C to 125°C
- Balanced Propagation Delay and Transition Times
- Significant Power Reduction Compared to LSTTL Logic ICs
- · Alternate Source is Philips/Signetics
- HC Types
 - 2V to 6V Operation
 - High Noise Immunity: N_{IL} = 30%, N_{IH} = 30% of V_{CC} at $V_{CC} = 5V$
- HCT Types
 - 4.5V to 5.5V Operation
 - Direct LSTTL Input Logic Compatibility, V_{IL} = 0.8V (Max), V_{IH} = 2V (Min)
 - CMOS Input Compatibility, $I_I \le 1\mu A$ at V_{OL} , V_{OH}

Description

The CD54HC00. CD74HC00. CD54HCT00. CD74HCT00 logic gates utilize silicon gate CMOS technology to achieve operating speeds similar to LSTTL gates with the low power consumption of standard CMOS integrated circuits. All devices have the ability to drive 10 LSTTL loads. The 74HCT logic family is functionally pin compatible with the standard 74LS logic family.

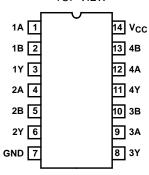
Ordering Information

PART NUMBER	TEMP. RANGE (°C)	PACKAGE
CD54HC00F3A	-55 to 125	14 Ld CERDIP
CD54HCT00F3A	-55 to 125	14 Ld CERDIP
CD74HC00E	-55 to 125	14 Ld PDIP
CD74HC00M	-55 to 125	14 Ld SOIC
CD74HC00MT	-55 to 125	14 Ld SOIC
CD74HC00M96	-55 to 125	14 Ld SOIC
CD74HCT00E	-55 to 125	14 Ld PDIP
CD74HCT00M	-55 to 125	14 Ld SOIC
CD74HCT00MT	-55 to 125	14 Ld SOIC
CD74HCT00M96	-55 to 125	14 Ld SOIC

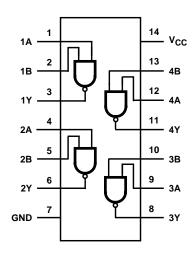
NOTE: When ordering, use the entire part number. The suffix 96 denotes tape and reel. The suffix T denotes a small-quantity reel of 250.

Pinout

CD54HC00, CD54HCT00, (CERDIP) CD74HC00, CD74HCT00 (PDIP, SOIC) TOP VIEW



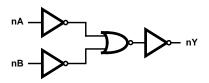
Functional Diagram



TRUTH TABLE

INP	INPUTS							
nA	nB	nY						
L	L	Н						
L	Н	Н						
Н	L	Н						
Н	Н	L						

Logic Symbol



Absolute Maximum Ratings

DC Supply Voltage, V_{CC} ... -0.5V to 7V DC Input Diode Current, I_{IK} For $V_I < -0.5 V$ or $V_I > V_{CC} + 0.5 V$... $\pm 20 \text{mA}$ DC Output Diode Current, I_{OK} For $V_O < -0.5 V$ or $V_O > V_{CC} + 0.5 V$... $\pm 20 \text{mA}$ DC Output Source or Sink Current per Output Pin, I_O For $V_O > -0.5 V$ or $V_O < V_{CC} + 0.5 V$... $\pm 25 \text{mA}$ DC V_{CC} or Ground Current, V_{CC} or V_{CC} or V_{CC} ... V_{CC} ...

Thermal Information

Thermal Resistance (Typical, Note 1)	θ_{JA} (°C/W)
E (PDIP) Package	80
M (SOIC) Package	
Maximum Junction Temperature (Hermetic Package of	r Die) 175 ⁰ C
Maximum Junction Temperature (Plastic Package) .	150°C
Maximum Storage Temperature Range	-65°C to 150°C
Maximum Lead Temperature (Soldering 10s)	300°C
(SOIC - Lead Tips Only)	

Operating Conditions

Temperature Range (T _A)55°C to 125°C
Supply Voltage Range, V _{CC}
HC Types2V to 6V
HCT Types
DC Input or Output Voltage, V _I , V _O 0V to V _{CC}
Input Rise and Fall Time
2V
4.5V 500ns (Max)
6V

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

1. The package thermal impedance is calculated in accordance with JESD 51-7.

DC Electrical Specifications

		TEST CONDITIONS			25°C			-40°C 1	O 85°C	-55°C T	O 125 ⁰ C	
PARAMETER	SYMBOL	V _I (V)	I _O (mA)	V _{CC} (V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNITS
HC TYPES												
High Level Input	V _{IH}	-	-	2	1.5	-	-	1.5	-	1.5	-	V
Voltage				4.5	3.15	-	-	3.15	-	3.15	-	V
				6	4.2	-	-	4.2	-	4.2	-	٧
Low Level Input	V _{IL}	-	-	2	-	-	0.5	-	0.5	-	0.5	٧
Voltage				4.5	-	-	1.35	-	1.35	-	1.35	٧
				6	-	-	1.8	-	1.8	-	1.8	٧
High Level Output Voltage CMOS Loads	V _{OH}	V _{IH} or	-0.02	2	1.9	-	-	1.9	-	1.9	-	٧
		V _{IL}	-0.02	4.5	4.4	-	-	4.4	-	4.4	-	٧
			-0.02	6	5.9	-	-	5.9	-	5.9	-	٧
High Level Output			-	-	-	-	-	-	-	-	-	٧
Voltage TTL Loads			-4	4.5	3.98	-	-	3.84	-	3.7	-	٧
			-5.2	6	5.48	-	-	5.34	-	5.2	-	٧
Low Level Output	V _{OL}	V _{IH} or	0.02	2	-	-	0.1	-	0.1	-	0.1	V
Voltage CMOS Loads		V _{IL}	0.02	4.5	-	-	0.1	-	0.1	-	0.1	٧
			0.02	6	-	-	0.1	-	0.1	-	0.1	٧
Low Level Output			-	-	-	-	-	-	-	-	-	V
Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V
			5.2	6	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	lı	V _{CC} or GND	-	6	-	-	±0.1	-	±1	-	±1	μА

DC Electrical Specifications (Continued)

			ST ITIONS			25°C		-40°C T	O 85°C	-55°C T	O 125°C	
PARAMETER	SYMBOL	V _I (V)	I _O (mA)	V _{CC} (V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNITS
Quiescent Device Current	Icc	V _{CC} or GND	0	6	-	-	2	-	20	-	40	μА
HCT TYPES												
High Level Input Voltage	V _{IH}	-	-	4.5 to 5.5	2	-	-	2	-	2	-	V
Low Level Input Voltage	V _{IL}	-	-	4.5 to 5.5	-	-	0.8	-	0.8	-	0.8	V
High Level Output Voltage CMOS Loads	V _{OH}	V _{IH} or V _{IL}	- 0.02	4.5	4.4	-	-	4.4	-	4.4	-	V
High Level Output Voltage TTL Loads			- 4	4.5	3.98	-	-	3.84	-	3.7	-	V
Low Level Output Voltage CMOS Loads	V _{OL}	V _{IH} or V _{IL}	0.02	4.5	-	-	0.1	-	0.1	-	0.1	V
Low Level Output Voltage TTL Loads			4	4.5	-	-	0.26	-	0.33	-	0.4	V
Input Leakage Current	I _I	V _{CC} and GND	-	5.5	-		±0.1	-	±1	-	±1	μА
Quiescent Device Current	Icc	V _{CC} or GND	0	5.5	-	-	2	-	20	-	40	μΑ
Additional Quiescent Device Current Per Input Pin: 1 Unit Load	ΔI _{CC} (Note 2)	V _{CC} - 2.1	-	4.5 to 5.5	-	100	360	-	450	-	490	μА

NOTE:

HCT Input Loading Table

INPUT	UNIT LOADS					
nA	1.8					
nB	1.1					

NOTE: Unit Load is ΔI_{CC} limit specified in DC Electrical Specifications table, e.g. $360\mu A$ max at $25^{0}C.$

Switching Specifications Input t_r, t_f = 6ns

		TEST	vcc	25°C			-40°C TO 85°C		-55°C TO 125°C		
PARAMETER	SYMBOL	CONDITIONS	(V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNITS
HC TYPES											
Propagation Delay, Input to Output (Figure 1)	t _{PLH} , t _{PHL}	C _L = 50pF	2	-	-	90	-	115	-	135	ns
			4.5	-	-	18	-	23	-	27	ns
			6	-	-	15	-	20	-	23	ns
Propagation Delay, Data Input to Output Y	t _{PLH} , t _{PHL}	C _L = 15pF	5	-	7	-	-	-	-	-	pF

^{2.} For dual-supply systems theorectical worst case (V_I = 2.4V, V_{CC} = 5.5V) specification is 1.8mA.

Switching Specifications Input t_r , $t_f = 6ns$ (Continued)

		TEST	v _{cc}		25°C		-40°C T	O 85°C	-55°C T	O 125°C	
PARAMETER	SYMBOL	CONDITIONS	(V)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNITS
Transition Times (Figure 1)	t _{TLH} , t _{THL}	C _L = 50pF	2	ı	ı	75	-	95	18	110	ns
			4.5	ı	ı	15	-	19	-	22	ns
			6	-	-	13	-	16	-	19	ns
Input Capacitance	Cl	-	-	-	-	10	-	10	-	10	pF
Power Dissipation Capacitance (Notes 3, 4)	C _{PD}	-	5	-	25	-	-	-	-	-	pF
HCT TYPES											
Propagation Delay, Input to Output (Figure 2)	t _{PLH} , t _{PHL}	C _L = 50pF	4.5	-	-	20	-	25	-	30	ns
Propagation Delay, Data Input to Output Y	t _{PLH} , t _{PHL}	C _L = 15pF	5	-	8	-	-	-	-	-	pF
Transition Times (Figure 2)	t _{TLH} , t _{THL}	C _L = 50pF	4.5	-	-	15	-	19	-	22	ns
Input Capacitance	Cl	-	-	-	-	10	-	10	-	10	pF
Power Dissipation Capacitance (Notes 3, 4)	C _{PD}	-	5	ı	25	i	-	1	-	-	pF

NOTES:

- 3. $C_{\mbox{\scriptsize PD}}$ is used to determine the dynamic power consumption, per gate.
- 4. $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$ where f_i = input frequency, C_L = output load capacitance, V_{CC} = supply voltage.

Test Circuits and Waveforms

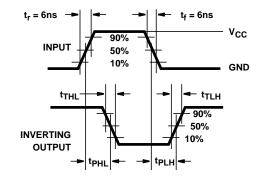


FIGURE 1. HC AND HCU TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC

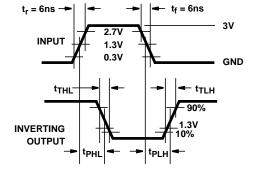


FIGURE 2. HCT TRANSITION TIMES AND PROPAGATION DELAY TIMES, COMBINATION LOGIC

INPUT LEVEL	HC TYPES	HCT TYPES
	V _{CC}	3V
V _S	50% V _{CC}	1.3V

NOTE: Transition times and propagation delay times.





10-Jun-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	_	Pins	_	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
5962-8683101CA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8683101CA CD54HCT00F3A	Samples
CD54HC00F	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD54HC00F	Samples
CD54HC00F3A	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	8403701CA CD54HC00F3A	Samples
CD54HCT00F	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	CD54HCT00F	Samples
CD54HCT00F3A	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-8683101CA CD54HCT00F3A	Samples
CD74HC00E	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC00E	Samples
CD74HC00EE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC00E	Samples
CD74HC00M	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC00M	Samples
CD74HC00M96	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC00M	Samples
CD74HC00M96E4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC00M	Samples
CD74HC00M96G4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC00M	Samples
CD74HC00ME4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC00M	Samples
CD74HC00MT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HC00M	Samples
CD74HCT00E	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT00E	Samples
CD74HCT00EE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT00E	Samples
CD74HCT00M	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	НСТ00М	Samples
CD74HCT00M96	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	HCT00M	Samples



PACKAGE OPTION ADDENDUM

10-Jun-2014

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish (6)	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
CD74HCT00M96E4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	НСТ00М	Samples
CD74HCT00M96G4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	НСТ00М	Samples
CD74HCT00ME4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	НСТ00М	Samples
CD74HCT00MG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	НСТ00М	Samples
CD74HCT00MT	ACTIVE	SOIC	D	14	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-55 to 125	НСТ00М	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes. **Pb-Free** (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

- (3) MSL, Peak Temp. The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.



PACKAGE OPTION ADDENDUM

10-Jun-2014

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OTHER QUALIFIED VERSIONS OF CD54HC00, CD54HCT00, CD74HC00, CD74HCT00:

Military: CD54HC00, CD54HCT00

NOTE: Qualified Version Definitions:

Catalog - TI's standard catalog product

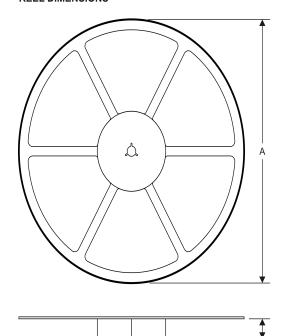
• Military - QML certified for Military and Defense Applications

PACKAGE MATERIALS INFORMATION

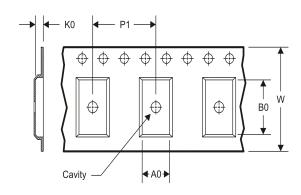
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TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*All dimensions are nominal

Device		Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CD74HC00M96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HC00MT	SOIC	D	14	250	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HCT00M96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD74HCT00MT	SOIC	D	14	250	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

PACKAGE MATERIALS INFORMATION

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*All dimensions are nominal

7.11 difference de Merimia										
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)			
CD74HC00M96	SOIC	D	14	2500	367.0	367.0	38.0			
CD74HC00MT	SOIC	D	14	250	367.0	367.0	38.0			
CD74HCT00M96	SOIC	D	14	2500	367.0	367.0	38.0			
CD74HCT00MT	SOIC	D	14	250	367.0	367.0	38.0			

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