

DATA SHEET

For a complete data sheet, please also download:

- The IC06 74HC/HCT/HCU/HCMOS Logic Family Specifications
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Information
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Outlines

74HC/HCT42 BCD to decimal decoder (1-of-10)

Product specification
File under Integrated Circuits, IC06

December 1990

BCD to decimal decoder (1-of-10)**74HC/HCT42****FEATURES**

- Mutually exclusive outputs
- 1-of-8 demultiplexing capability
- Outputs disabled for input codes above nine
- Output capability: standard
- I_{CC} category: MSI

GENERAL DESCRIPTION

The 74HC/HCT42 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT42 decoders accept four active HIGH BCD inputs and provide 10 mutually exclusive active LOW outputs. The active LOW outputs facilitate addressing other MSI circuits with active LOW input enables.

The logic design of the “42” ensures that all outputs are HIGH when binary codes greater than nine are applied to the inputs.

The most significant input (A₃) produces an useful inhibit function when the “42” is used as a 1-of-8 decoder. The A₃ input can also be used as the data input in an 8-output demultiplexer application.

QUICK REFERENCE DATA

GND = 0 V; T_{amb} = 25 °C; t_r = t_f = 6 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t _{PHL} /t _{PLH}	propagation delay A _n to \bar{Y}_n	C _L = 15 pF; V _{CC} = 5 V	14	17	ns
C _I	input capacitance		3.5	3.5	pF
C _{PD}	power dissipation capacitance per package	notes 1 and 2	37	37	pF

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz

f_o = output frequency in MHz

∑ (C_L × V_{CC}² × f_o) = sum of outputs

C_L = output load capacitance in pF

V_{CC} = supply voltage in V

2. For HC the condition is V_I = GND to V_{CC}
For HCT the condition is V_I = GND to V_{CC} – 1.5 V

ORDERING INFORMATION

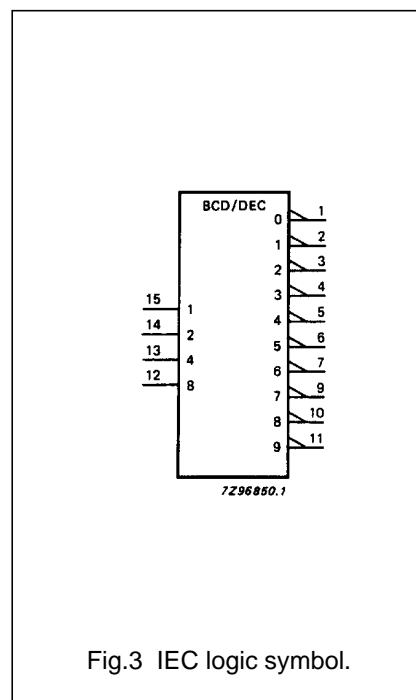
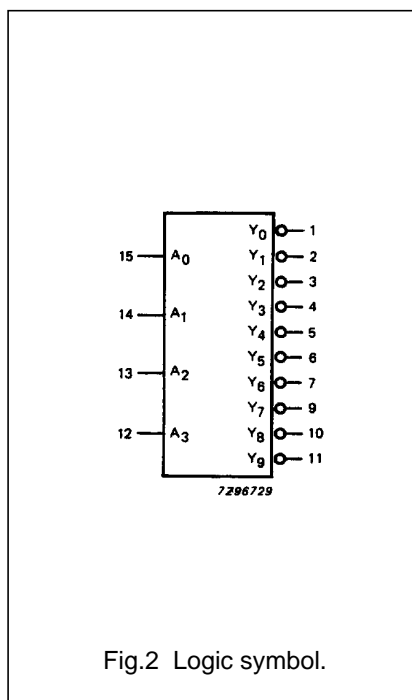
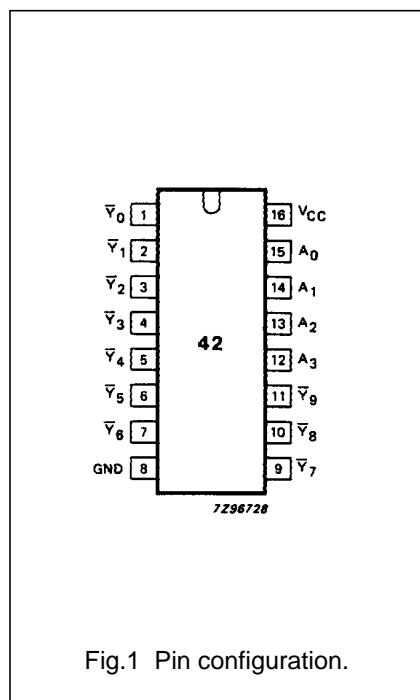
See “74HC/HCT/HCU/HCMOS Logic Package Information”.

BCD to decimal decoder (1-of-10)

74HC/HCT42

PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1, 2, 3, 4, 5, 6, 7, 9, 10, 11	\bar{Y}_0 to \bar{Y}_9	multiplexer outputs
8	GND	ground (0 V)
15, 14, 13, 12	A_0 to A_3	data inputs
16	V_{CC}	positive supply voltage



BCD to decimal decoder (1-of-10)

74HC/HCT42

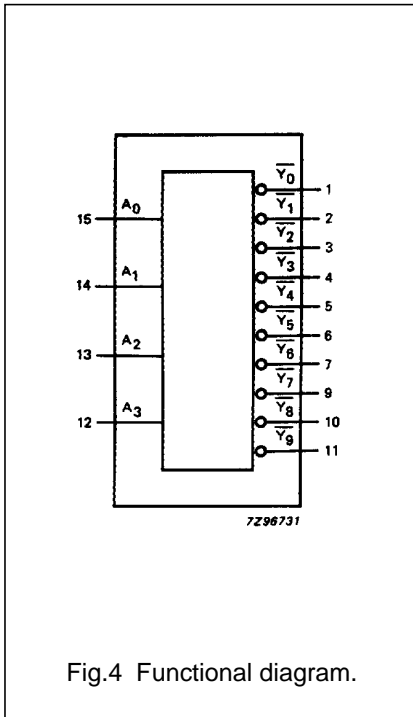


Fig.4 Functional diagram.

FUNCTION TABLE

INPUTS				OUTPUTS									
A ₃	A ₂	A ₁	A ₀	\bar{Y}_0	\bar{Y}_1	\bar{Y}_2	\bar{Y}_3	\bar{Y}_4	\bar{Y}_5	\bar{Y}_6	\bar{Y}_7	\bar{Y}_8	\bar{Y}_9
L	L	L	L	L	H	H	H	H	H	H	H	H	H
L	L	L	H	H	L	H	H	H	H	H	H	H	H
L	L	H	L	H	H	L	H	H	H	H	H	H	H
L	L	H	H	H	H	H	L	H	H	H	H	H	H
L	H	L	L	H	H	H	H	L	H	H	H	H	H
L	H	L	H	H	H	H	H	H	L	H	H	H	H
L	H	H	L	H	H	H	H	H	H	L	H	H	H
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H	L	H	L	H	H	H	H	H	H	H	H	H	H
H	L	H	H	H	H	H	H	H	H	H	H	H	H
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H	H	H	L	H	H	H	H	H	H	H	H	H	H
H	H	H	H	H	H	H	H	H	H	H	H	H	H

Note

- 1. H = HIGH voltage level
- L = LOW voltage level

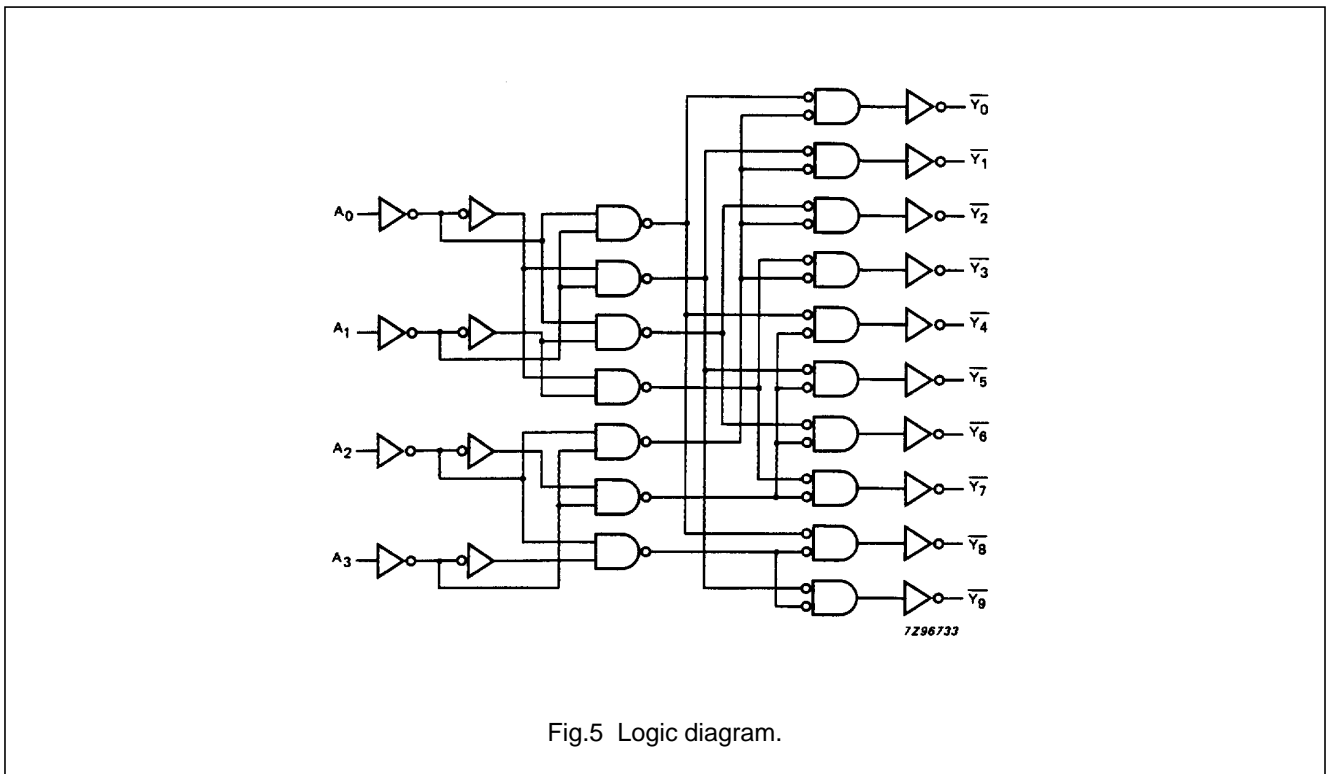


Fig.5 Logic diagram.

BCD to decimal decoder (1-of-10)

74HC/HCT42

DC CHARACTERISTICS FOR 74HC

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard

I_{CC} category: MSI

AC CHARACTERISTICS FOR 74HC

GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

SYMBOL	PARAMETER	T _{amb} (°C)								UNIT	TEST CONDITIONS	
		74HC									V _{CC} (V)	WAVEFORMS
		+25			-40 to +85		-40 to +125					
		min.	typ.	max.	min.	max.	min.	max.				
t _{PHL} / t _{PLH}	propagation delay A _n to \bar{Y}_n		47 17 14	150 30 26		190 38 33		225 45 38	ns	2.0 4.5 6.0	Fig.6	
t _{THL} / t _{TLH}	output transition time		19 7 6	75 15 13		95 19 16		110 22 19	ns	2.0 4.5 6.0	Fig.6	

DC CHARACTERISTICS FOR 74HCT

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard

I_{CC} category: MSI

Note to HCT types

The value of additional quiescent supply current (ΔI_{CC}) for a unit load of 1 is given in the family specifications. To determine ΔI_{CC} per input, multiply this value by the unit load coefficient shown in the table below.

INPUT	UNIT LOAD COEFFICIENT
A _n	1.0

AC CHARACTERISTICS FOR 74HCT

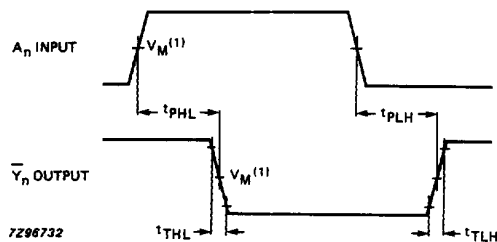
GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

SYMBOL	PARAMETER	T _{amb} (°C)								UNIT	TEST CONDITIONS	
		74HCT									V _{CC} (V)	WAVEFORMS
		+25			-40 to +85		-40 to +125					
		min.	typ.	max.	min.	max.	min.	max.				
t _{PHL} / t _{PLH}	propagation delay A _n to \bar{Y}_n		20	35		44		53	ns	4.5	Fig.6	
t _{THL} / t _{TLH}	output transition time		7	15		19		22	ns	4.5	Fig.6	

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AC WAVEFORMS



(1) HC : $V_M = 50\%$; $V_I = \text{GND to } V_{CC}$.
 HCT: $V_M = 1.3 \text{ V}$; $V_I = \text{GND to } 3 \text{ V}$.

Fig.6 Waveforms showing the input (A_n) to output (\bar{Y}_n) propagation delays and the output transition times.

PACKAGE OUTLINES

See "74HC/HCT/HCU/HCMOS Logic Package Outlines".

74HC/HCT42; BCD to decimal decoder (1-of-10)

Information as of 2003-04-22

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General description

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The 74HC/HCT42 decoders accept four active HIGH BCD inputs and provide 10 mutually exclusive active LOW outputs. The active LOW outputs facilitate addressing other MSI circuits with active LOW input enables.


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The most significant input (A₃) produces an useful inhibit function when the '42' is used as a 1-of-8 decoder. The A₃ input can also be used as the data input in an 8-output demultiplexer application.

Features




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□ Datasheet

<u>Type number</u>	<u>Title</u>	<u>Publication release date</u>	<u>Datasheet status</u>	<u>Page count</u>	<u>File size (kB)</u>	<u>Datasheet</u>
74HC/HCT42	BCD to decimal decoder (1-of-10)	12/1/1990	Product specification	6	40	 Download

Additional datasheet info

To complete the device datasheet with package and family information, also download the following PDF files. The "Logic Package Information" document is required to determine in which package(s) this device is available.

	Document	Description
1	 HCT_FAMILY_SPECIFICATIONS	HC/T Family Specifications, The IC06 74HC/HCT/HCMOS Logic Family Specifications
2	 HCT_PACKAGE_INFO	HC/T Package Info, The IC06 74HC/HCT/HCMOS Logic Package Information
3	 HCT_PACKAGE_OUTLINES	HC/T Package Outlines, The IC06 74HC/HCT/HCMOS Logic Package Outlines

□ Parametrics

Type number	Package	Description	Propagation Delay(ns)	Voltage	No. of Pins	Power Dissipation Considerations	Logic Switching Levels	Output Drive Capability
74HC42D	SOT109 (SO16)	BCD to Decimal Decoder (1-of-10)	15	5 Volts +	16	Low Power or Battery Applications	CMOS	Low
74HC42N	SOT38-1 (DIP16)	BCD to Decimal Decoder (1-of-10)	15	5 Volts +	16	Low Power or Battery Applications	CMOS	Low
74HCT42D	SOT109 (SO16)	BCD to Decimal Decoder (1-of-10); TTL Enabled	15	5 Volts +	16	Low Power or Battery Applications	TTL	Low
74HCT42N	SOT38-1 (DIP16)	BCD to Decimal Decoder (1-of-10); TTL Enabled	15	5 Volts +	16	Low Power or Battery Applications	TTL	Low

❑ Products, packages, availability and ordering

<u>Type number</u>	<u>North American type number</u>	<u>Ordering code (12NC)</u>	<u>Marking/Packing</u> Discretes packing info	<u>Package</u>	<u>Device status</u>	<u>Buy online</u>
74HC42D	74HC42D	9337 148 60652	Standard Marking * Bulk Pack, CECC	SOT109 (SO16)	Full production	order this <input type="checkbox"/>
	74HC42D-T	9337 148 60653	Standard Marking * Reel Pack, SMD, 13", CECC	SOT109 (SO16)	Full production	order this <input type="checkbox"/>
74HC42N	74HC42N	9336 697 90652	Standard Marking * Bulk Pack, CECC	SOT38-1 (DIP16)	Full production	order this <input type="checkbox"/>
74HCT42D	74HCT42D	9337 153 40652	Standard Marking * Bulk Pack, CECC	SOT109 (SO16)	Full production	order this <input type="checkbox"/>
	74HCT42D-T	9337 153 40653	Standard Marking * Reel Pack, SMD, 13", CECC	SOT109 (SO16)	Full production	order this <input type="checkbox"/>
74HCT42N	74HCT42N	9336 704 20652	Standard Marking * Bulk Pack, CECC	SOT38-1 (DIP16)	Full production	order this <input type="checkbox"/>

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❑ Support & tools

[HC/T Family Specifications, The IC06 74HC/HCT/HCMOS Logic Family Specifications](#)(date 01-Mar-98)

[HC/T User Guide](#)(date 01-Nov-97)

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