

BCD-TO-DECIMAL DECODER

DESCRIPTION

The M74LS42P is a semiconductor integrated circuit provided with a BCD-to-decimal decoder function.

FEATURES

- All outputs set high with reactive input
- Usable as a 3-bit binary/octal decoder
- Wide operating temperature range ($T_a = -20 \sim +75^{\circ}\text{C}$)

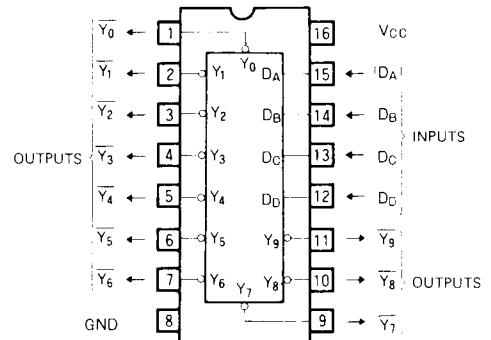
APPLICATION

General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

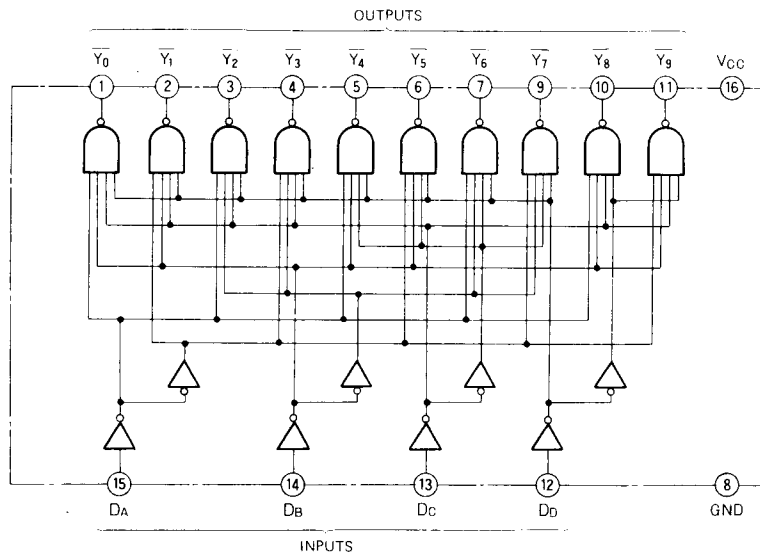
When inputs D_A , D_B , D_C and D_D are specified in BCD code, the output corresponding to the number among $\overline{Y}_0 \sim \overline{Y}_9$ is set low and all the other 9 outputs are set high. When a binary number of 10 or more is applied to $D_A \sim D_D$, all the outputs are set high.

PIN CONFIGURATION (TOP VIEW)



Outline 16P4

BLOCK DIAGRAM



BCD-TO-DECIMAL DECODER

FUNCTION TABLE

Decimal number	D _D	D _C	D _B	D _A	$\bar{Y}_0$	$\bar{Y}_1$	$\bar{Y}_2$	$\bar{Y}_3$	$\bar{Y}_4$	$\bar{Y}_5$	$\bar{Y}_6$	$\bar{Y}_7$	$\bar{Y}_8$	$\bar{Y}_9$
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
10	H	L	H	L	H	H	H	H	H	H	H	H	H	H
11	H	L	H	H	H	H	H	H	H	H	H	H	H	H
12	H	H	L	L	H	H	H	H	H	H	H	H	H	H
13	H	H	L	H	H	H	H	H	H	H	H	H	H	H
14	H	H	H	L	H	H	H	H	H	H	H	H	H	H
15	H	H	H	H	H	H	H	H	H	H	H	H	H	H

ABSOLUTE MAXIMUM RATINGS (Ta = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter	Conditions	Limits	Unit
V _{CC}	Supply voltage		-0.5 ~ +7	V
V _I	Input voltage		-0.5 ~ +15	V
V _O	Output voltage	High-level state	-0.5 ~ V _{CC}	V
T _{opr}	Operating free-air ambient temperature range		-20 ~ +75	°C
T _{stg}	Storage temperature range		-65 ~ +150	°C

RECOMMENDED OPERATING CONDITIONS (Ta = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter		Limits			Unit
			Min	Typ	Max	
V _{CC}	Supply voltage		4.75	5	5.25	V
I _{OH}	High-level output current	V _{OH} ≥ 2.7 V	0		-400	μA
I _{OL}	Low-level output current	V _{OL} ≤ 0.4 V	0		4	mA
		V _{OL} ≤ 0.5 V	0		8	mA

ELECTRICAL CHARACTERISTICS (Ta = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ *	Max	
V _{IH}	High-level input voltage		2			V
V _{IL}	Low-level input voltage				0.8	V
V _{IC}	Input clamp voltage	V _{CC} = 4.75 V, I _{IC} = -18 mA			-1.5	V
V _{OH}	High-level output voltage	V _{CC} = 4.75 V, V _I = 0.8 V V _I = 2 V, I _{OH} = -400 μA	2.7	3.4		V
V _{OL}	Low-level output voltage	V _{CC} = 4.75 V, I _{OL} = 4 mA		0.25	0.4	V
		V _I = 0.8 V, V _I = 2 V, I _{OL} = 8 mA		0.35	0.5	V
I _{IH}	High-level input current	V _{CC} = 5.25 V, V _I = 2.7 V			20	μA
I _{IL}	Low-level input current	V _{CC} = 5.25 V, V _I = 10 V			0.1	mA
I _{OS}	Short-circuit output current (Note 1)	V _{CC} = 5.25 V, V _O = 0 V			-0.4	mA
I _{CC}	Supply current	V _{CC} = 5.25 V (Note 2)	-20	7	-100	mA

* : All typical values are at V_{CC} = 5 V, Ta = 25°C

Note 1: All measurements should be done quickly and not more than one output should be shorted at a time.

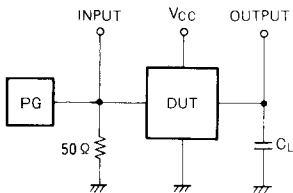
Note 2: I_{CC} is measured with all inputs at 0V.

BCD-TO-DECIMAL DECODER

SWITCHING CHARACTERISTICS (V_{CC} = 5 V, T_a = 25°C, unless otherwise noted)

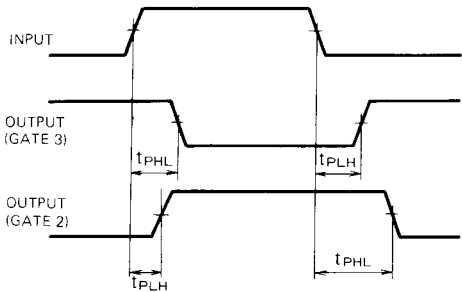
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t _{PLH}	Low-to-high-level, high-to-low-level output propagation time, gate 2	C _L = 15 pF (Note 3)		8	25	ns
t _{PHL}	Low-to-high-level, high-to-low-level output propagation time, gate 2			14	25	ns
t _{PLH}	Low-to-high-level, high-to-low-level output propagation time, gate 3			12	30	ns
t _{PHL}	Low-to-high-level, high-to-low-level output propagation time, gate 3			12	30	ns

Note 3: Measurement circuit



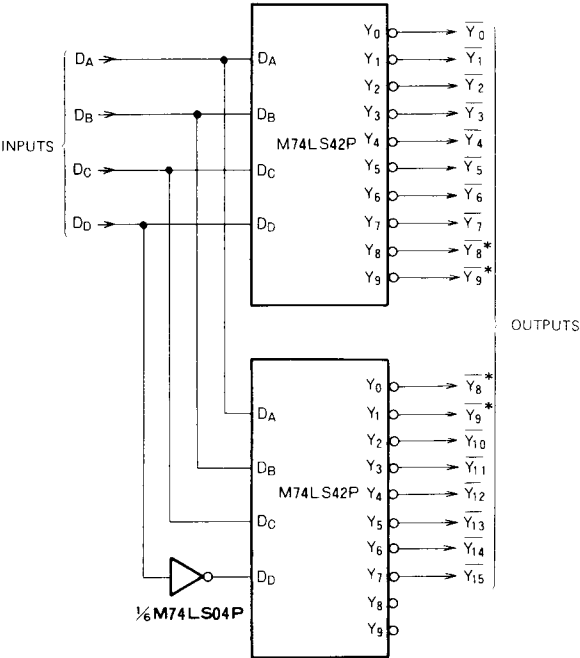
- (1) The pulse generator (PG) has the following characteristics:
PRR = 1MHz, t_r = 6ns, t_f = 6ns, t_w = 500ns, V_p = 3V_{p.p.}, Z₀ = 50Ω
- (2) C_L includes probe and jig capacitance

TIMING DIAGRAM (Reference level = 1.3V)



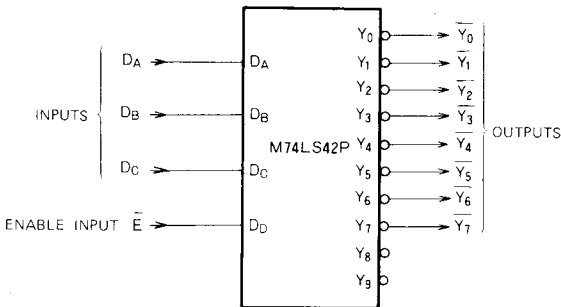
APPLICATION EXAMPLES

(1) 4-bit binary/hexadecimal decoder



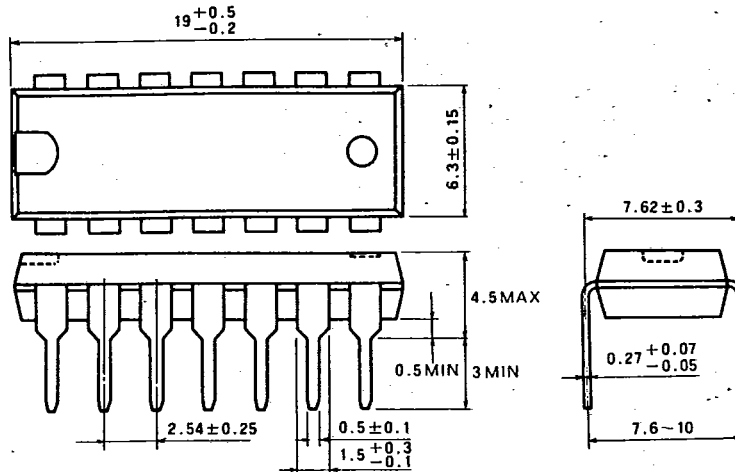
Outputs marked with * are provided from both decoders.

(2) 3-bit binary/octal decoder with enable input



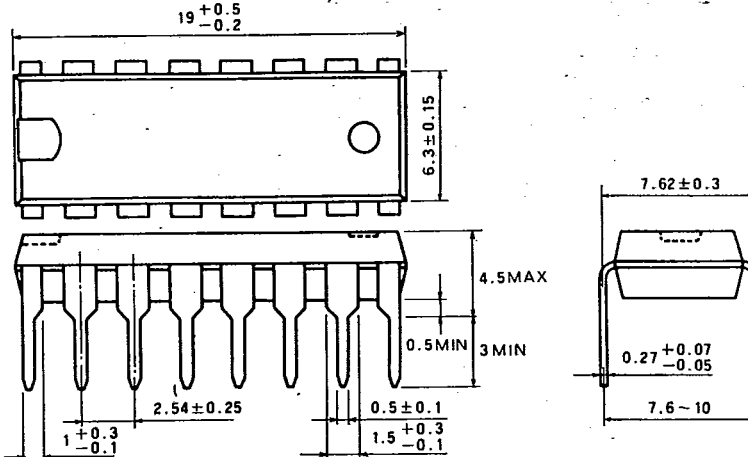
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm

