

BCD-to-decimal decoder

BU4028B

The BU4028B is a decoder which converts BDC signals to decimal signals.

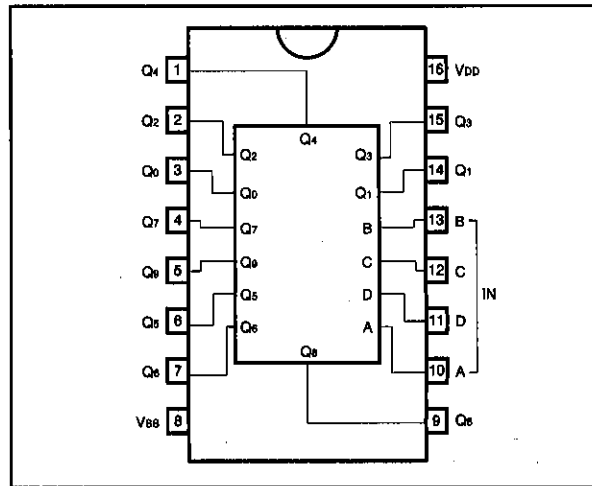
Of the ten outputs Q_0 to Q_9 , those corresponding to the A to D input codes are set to "H", and the others are all set to "L".

If inputs A to C are used and input D is used as disabled input, the BU4028B can also be used as a 1-of-8 decoder.

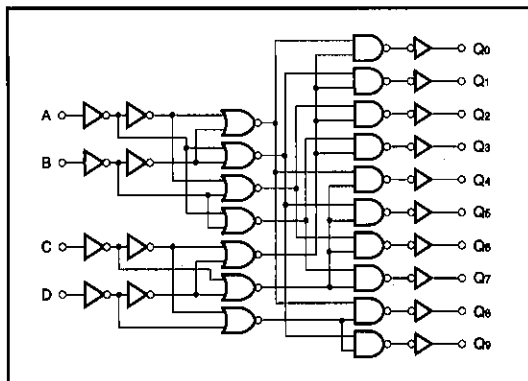
●Features

- | | |
|---|---|
| 1) Low power consumption. | 4) High fan-out. |
| 2) Wide range of operating power supply voltages. | 5) Direct drive of 2 L-TTL inputs and 1 LS-TTL input. |
| 3) High input impedance. | |

●Block diagram



●Logic diagram



● Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{DD}	-0.3~18	V
Power dissipation	P _d	1000 (DIP)	mW
Operating temperature	T _{opr}	-40~85	°C
Storage temperature	T _{stg}	-55~150	°C
Input voltage	V _{IN}	-0.3~V _{DD} +0.3	V

● Electrical characteristics

DC characteristics (unless otherwise noted, Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions		Measurement Circuit
						V _{DD} (V)		
"H" input voltage	V _{IH}	3.5	—	—	V	5	—	Fig.1
		7.0	—	—		10		
		11.0	—	—		15		
"L" input voltage	V _{IL}	—	—	1.5	V	5	—	Fig.1
		—	—	3.0		10		
		—	—	4.0		15		
"H" input current	I _{IH}	—	—	0.3	μA	15	V _{IH} =15V	Fig.1
"L" input current	I _{IL}	—	—	-0.3	μA	15	V _{IL} =0V	Fig.1
"H" output voltage	V _{OH}	4.95	—	—	V	5	I _O =0mA	Fig.1
		9.95	—	—		10		
		14.95	—	—		15		
"L" output voltage	V _{OL}	—	—	0.05	V	5	I _O =0mA	Fig.1
		—	—	0.05		10		
		—	—	0.05		15		
"H" output current	I _{OH}	-0.16	—	—	mA	5	V _{OH} =4.6V	Fig.1
		-0.4	—	—		10	V _{OH} =9.5V	
		-1.2	—	—		15	V _{OH} =13.5V	
"L" output current	I _{OL}	0.44	—	—	mA	5	V _{OL} =0.4V	Fig.1
		1.1	—	—		10	V _{OL} =0.5V	
		3.0	—	—		15	V _{OL} =1.5V	
Quiescent supply current	I _{DD}	—	—	1	μA	5	V _I =V _{DD} or GND	—
		—	—	2		10		
		—	—	4		15		

BU4000B series

CMOS logic

●Electrical characteristics

Switching characteristics (unless otherwise noted, Ta=25°C, CL=50pF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	V _{DD} (V)	Conditions	Measurement Circuit
Output rise time	t _{PLH}	—	180	—	ns	5	—	Fig.2, 3
		—	90	—		10		
		—	65	—		15		
Output fall time	t _{PHL}	—	100	—	ns	5	—	Fig.2, 3
		—	50	—		10		
		—	40	—		15		
"L" to "H" propagation delay time	t _{PLH}	—	300	—	ns	5	—	Fig.2, 3
		—	130	—		10		
		—	90	—		15		
"H" to "L" propagation delay time	t _{PHL}	—	300	—	ns	5	—	Fig.2, 3
		—	130	—		10		
		—	90	—		15		
Input capacitance	C _i	—	5	—	pF	—	—	—

●Truth table

INPUT				OUTPUT									
D	C	B	A	Q ₉	Q ₈	Q ₇	Q ₆	Q ₅	Q ₄	Q ₃	Q ₂	Q ₁	Q ₀
L	L	L	L	L	L	L	L	L	L	L	L	L	H
L	L	L	H	L	L	L	L	L	L	L	L	H	L
L	L	H	L	L	L	L	L	L	L	L	H	L	L
L	L	H	H	L	L	L	L	L	L	H	L	L	L
L	H	L	L	L	L	L	L	L	H	L	L	L	L
L	H	L	H	L	L	L	L	H	L	L	L	L	L
L	H	H	L	L	L	L	L	L	L	L	L	L	L
L	H	H	H	L	L	L	L	L	L	L	L	L	L
H	L	L	L	L	H	L	L	L	L	L	L	L	L
H	L	L	H	H	L	L	L	L	L	L	L	L	L
H	L	H	L	L	L	L	L	L	L	L	L	L	L
H	L	H	H	L	L	L	L	L	L	L	L	L	L
H	H	L	L	L	L	L	L	L	L	L	L	L	L
H	H	L	H	L	L	L	L	L	L	L	L	L	L
H	H	H	L	L	L	L	L	L	L	L	L	L	L
H	H	H	H	L	L	L	L	L	L	L	L	L	L

● Measurement circuits

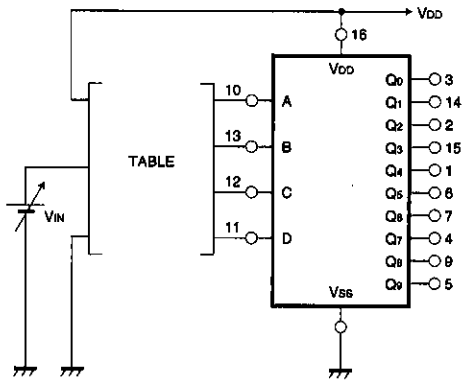
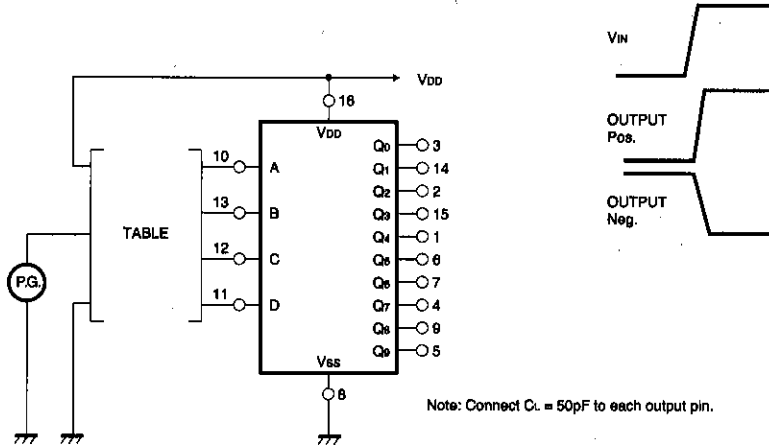


Fig. 1 DC characteristics measurement circuit

TEST NO.	INPUT				OUTPUT	
	A	B	C	D	Pos.	Neg.
1	V _{IN}	V _{SS}	V _{SS}	V _{SS}	Q ₁	Q ₀
2	V _{SS}	V _{IN}	V _{DD}	V _{SS}	Q ₆	Q ₄
3	V _{DD}	V _{DD}	V _{IN}	V _{SS}	Q ₇	Q ₃
4	V _{DD}	V _{SS}	V _{SS}	V _{IN}	Q ₈	Q ₁
5	V _{SS}	V _{IN}	V _{SS}	V _{SS}	Q ₂	Q ₀
6	V _{DD}	V _{SS}	V _{IN}	V _{SS}	Q ₆	Q ₁
7	V _{SS}	V _{SS}	V _{SS}	V _{IN}	Q ₈	Q ₀
8	V _{SS}	V _{SS}	V _{IN}	V _{SS}	Q ₄	Q ₀
9	V _{IN}	V _{DD}	V _{SS}	V _{SS}	Q ₃	Q ₂



Note: Connect C_L = 50pF to each output pin.

Fig. 2 Switching characteristics measurement circuit

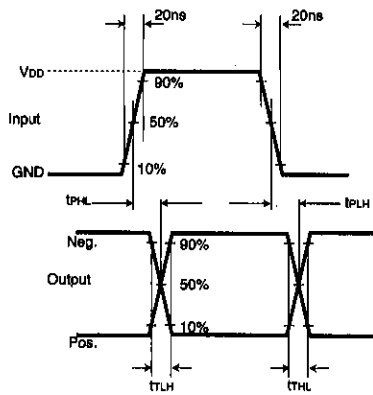


Fig. 3 Switching time test waveform

TEST NO.	INPUT				OUTPUT	
	A	B	C	D	Pos.	Neg.
1	P.G.	V _{SS}	V _{SS}	V _{SS}	Q ₁	Q ₀
2	V _{SS}	P.G.	V _{DD}	V _{SS}	Q ₆	Q ₄
3	V _{DD}	V _{DD}	P.G.	V _{SS}	Q ₇	Q ₃
4	V _{DD}	V _{SS}	V _{SS}	P.G.	Q ₈	Q ₁
5	V _{SS}	P.G.	V _{SS}	V _{SS}	Q ₂	Q ₀
6	V _{DD}	V _{SS}	P.G.	V _{SS}	Q ₅	Q ₁
7	V _{SS}	V _{SS}	V _{SS}	P.G.	Q ₈	Q ₀
8	V _{SS}	V _{SS}	P.G.	V _{SS}	Q ₄	Q ₀
9	P.G.	V _{DD}	V _{SS}	V _{SS}	Q ₃	Q ₂

BU4000B series

CMOS logic

● Electrical characteristic curve

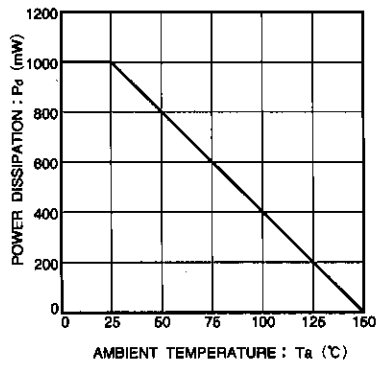
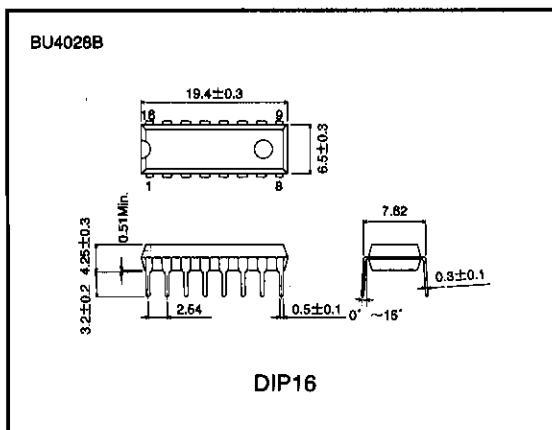


Fig.4 Power dissipation - Ta characteristic

● External dimensions (Units: mm)



Series Standard

BU4000B

The BU4000 Series are CMOS ICs featuring low voltage and low power consumption. The wide range of operating power supply voltages is compatible with the general-purpose 4000B Series, and when a 5V power supply voltage is used, the LS-TTL IC can be driven directly.

These ICs are available in SOP and SSOP packages as well as the standard DIP package.

●Features

- 1) Low power consumption.
- 2) Wide range of operating power supply voltages.
- 3) High input impedance.
- 4) High fan-out.
- 5) Direct drive of 2 L-TTL inputs and 1 LS-TTL input.

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{DD}	18 *1	V
Input voltage	V _{IN}	-0.3~V _{DD} +0.3	V
Power dissipation *2	P _d	Please refer to specifications for individual package	mW
Storage temperature	T _{stg}	-55~150	°C

*1 For the BU4XXXBC type, V_{DD} = 20 V.

*2 The values for the SOP and SSOP packages are the values when mounted on a glass epoxy PCB (50 mm x 50 mm x 1.6 mm).

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{DD}	3~16 *	V
Input voltage	V _{IN}	0~V _{DD}	V
Operating temperature	T _{opr}	-40~85	°C

* For the BU4XXXBC type, V_{DD} = 3 to 18 V.

●Electrical characteristic curves

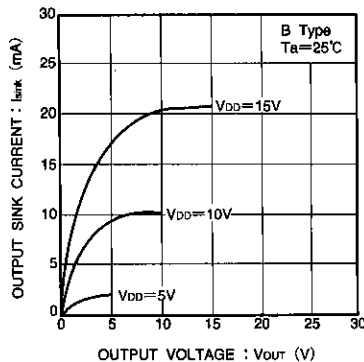


Fig.1 Output sink current - output voltage characteristic

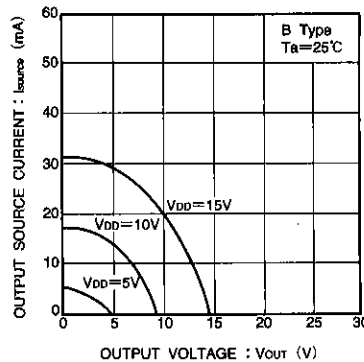


Fig.2 Output source current - output voltage characteristic

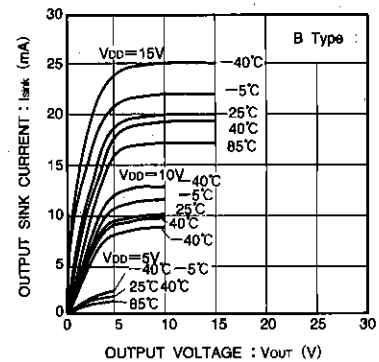


Fig.3 Output SINK current - output voltage characteristic

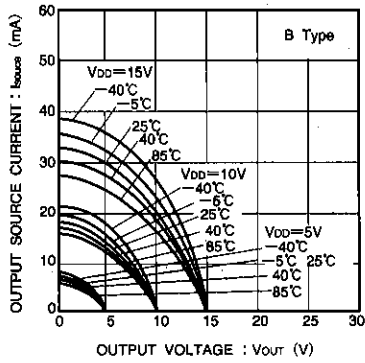


Fig.4 Output source current - output voltage characteristic

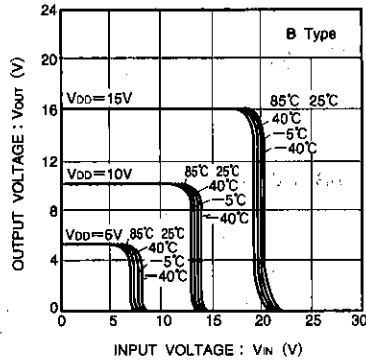


Fig.5 Output voltage - input voltage characteristic

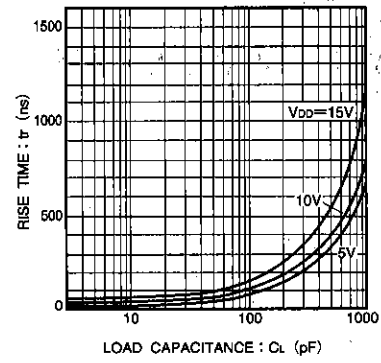


Fig.6 Rise time - load capacitance characteristic

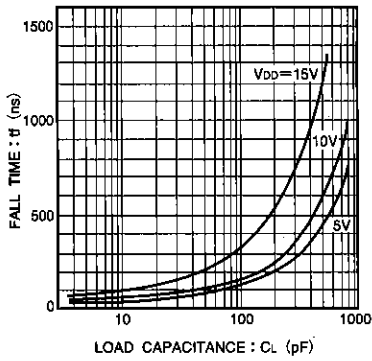


Fig.7 Fall time - load capacitance characteristic

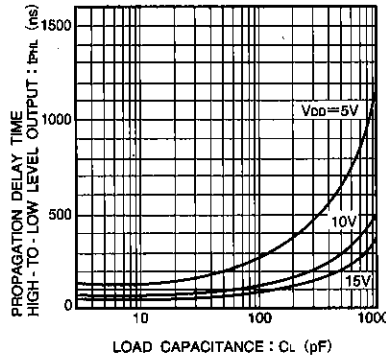


Fig.8 "H" to "L" propagation delay time - load capacitance characteristic

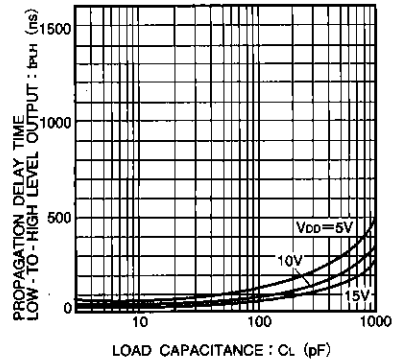


Fig.9 "L" to "H" propagation delay time - load capacitance characteristic

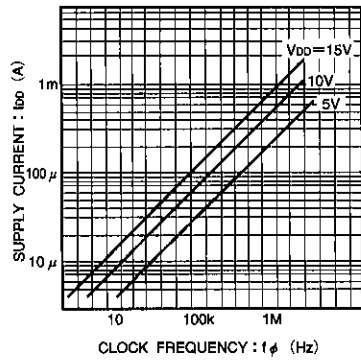


Fig.10 Supply current - clock frequency characteristic

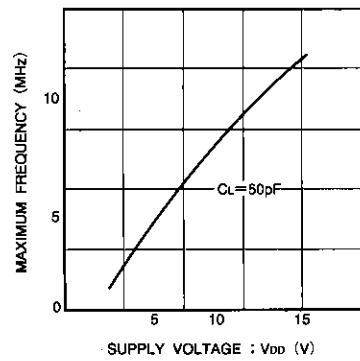


Fig.11 Maximum clock frequency - power supply voltage characteristic

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