

BCD-to-decimal decoder

BU4028B

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

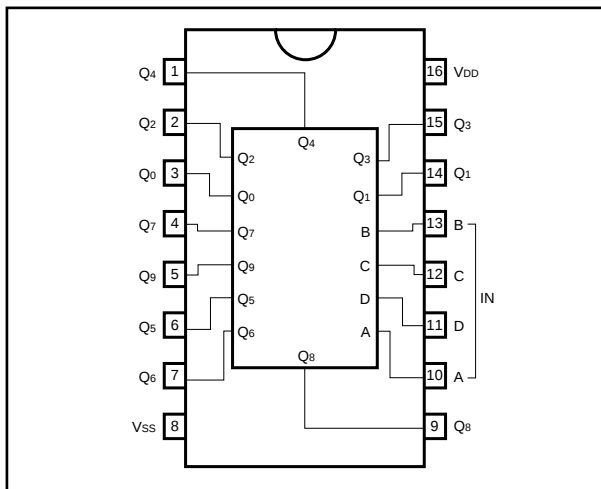
Of the ten outputs Q_0 to Q_9 , those corresponding to the A to D input codes are set to "H", and the others are all set to "L".

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.

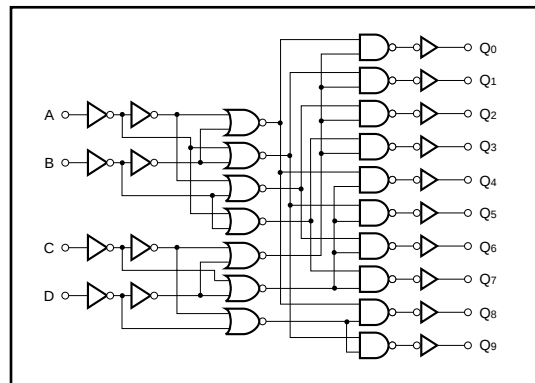
●Features

- 1) Low power dissipation.
- 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 1LS-TTL input.

●Block diagram



●Logic circuit diagram



● 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	H	L	L	L	L	L	L
L	H	H	H	L	L	H	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

● Absolute maximum ratings (Ta = 25°C, V_{SS} = 0V)

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, $T_a = 25^\circ\text{C}$, $V_{SS} = 0\text{V}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	V_{DD} (V)	Conditions	Measurement circuit
Input high level voltage	V_{IH}	3.5	—	—	V	5	—	Fig.1
		7.0	—	—		10		
		11.0	—	—		15		
Input low level voltage	V_{IL}	—	—	1.5	V	5	—	Fig.1
		—	—	3.0		10		
		—	—	4.0		15		
Input high level current	I_{IH}	—	—	0.3	μA	15	$V_{IH} = 15\text{V}$	Fig.1
Input low level current	I_{IL}	—	—	-0.3	μA	15	$V_{IL} = 0\text{V}$	Fig.1
Output high level voltage	V_{OH}	4.95	—	—	V	5	$I_O = 0\text{mA}$	Fig.1
		9.95	—	—		10		
		14.95	—	—		15		
Output low level voltage	V_{OL}	—	—	0.05	V	5	$I_O = 0\text{mA}$	Fig.1
		—	—	0.05		10		
		—	—	0.05		15		
Output high level current	I_{OH}	-0.16	—	—	mA	5	$V_{OH} = 4.6\text{V}$	Fig.1
		-0.4	—	—		10	$V_{OH} = 9.5\text{V}$	
		-1.2	—	—		15	$V_{OH} = 13.5\text{V}$	
Output low level current	I_{OL}	0.44	—	—	mA	5	$V_{OL} = 0.4\text{V}$	Fig.1
		1.1	—	—		10	$V_{OL} = 0.5\text{V}$	
		3.0	—	—		15	$V_{OL} = 1.5\text{V}$	
Static current dissipation	I_{DD}	—	—	1	μA	5	$V_I = V_{DD}$ or GND	—
		—	—	2		10		
		—	—	4		15		

Switching characteristics (Ta = 25°C, C_L = 50pF, V_{SS} = 0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	V _{DD} (V)	Conditions	Measurement circuit
Output rise time	t _{TLH}	—	180	—	ns	5	—	Fig.2, 3
		—	90	—		10		
		—	65	—		15		
Output fall time	t _{THL}	—	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 _{IN}	—	5	—	pF	—	—	—

●Measurement circuits

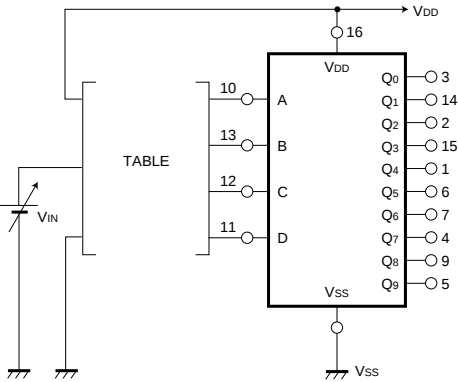
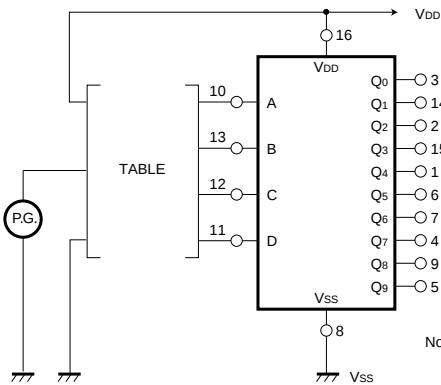


Fig. 1 DC characteristics measurement circuit

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 ₉	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 ₅	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.

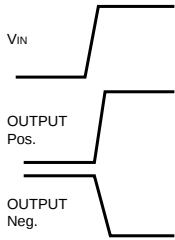


Fig. 2 Switching characteristics measurement circuit

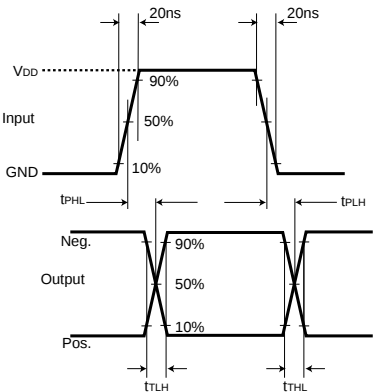


Fig. 3 Switching time test waveform

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 ₉	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

●Electrical characteristics curve

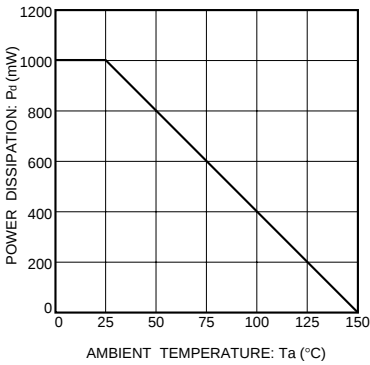


Fig.4 Power dissipation vs. T_a

●External dimensions (Units: mm)

