

CMOS HEX BUFFERS/CONVERTERS

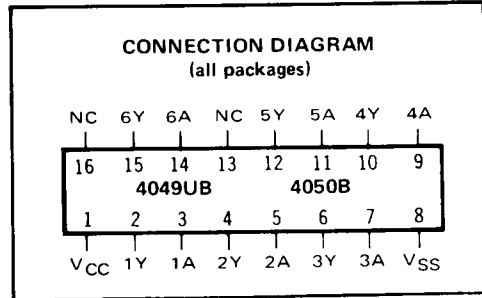
FEATURES

- ◆ Direct Drive of 2 TTL/DTL Loads
- ◆ Operation from Single Supply
- ◆ Pin-for Pin Replacements for 4009UB 4010B

DESCRIPTION

The 4049UB and 4050B are Inverting and Non-Inverting Hex Buffers, respectively, and feature logic-level conversions using only one supply voltage (V_{CC}). The Input-signal high level (V_{IH}) can exceed the V_{CC} supply voltage when these devices are used for logic-level conversions. These devices are intended for use as CMOS-to-DTL/TTL converters and can drive directly two DTL/TTL Loads.

The 4049UB and 4050B are interchangeable with 4009 UB and 4010B devices, respectively. In these applications the 4049UB and 4050B are pin-compatible with the 4009UB and 4010B, respectively, and can be substituted for these devices in existing as well as in new designs. Terminal No. 16 is not connected internally on the 4049UB or 4050B; therefore, connection to this terminal is of no consequence to circuit operation.



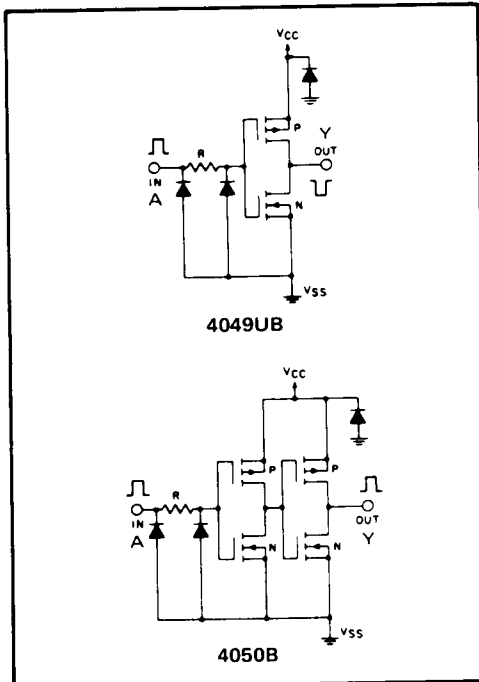
RECOMMENDED OPERATING CONDITIONS

For maximum reliability:

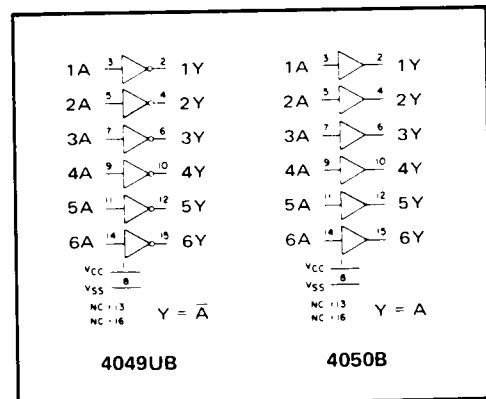
DC Supply Voltage	$V_{CC} - V_{SS}$	3 to 15	Vdc
Operating Temperature	T_A		
C, D, F, H Device		-55 to +125	°C
E Device		-40 to +85	°C

Note: These devices contain input protection networks to V_{SS} only. Therefore, V_{IH} (max) may exceed V_{CC} without damage (subject to absolute maximum ratings).

SCHEMATIC DIAGRAMS



LOGIC DIAGRAMS



ELECTRICAL CHARACTERISTICS

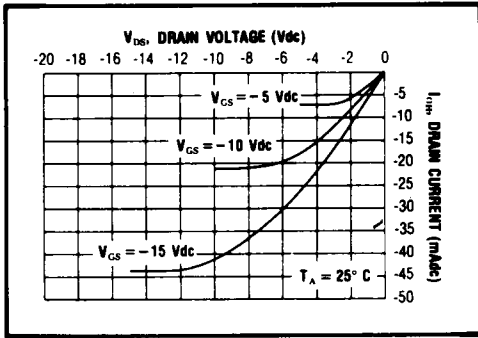
STATIC CHARACTERISTICS¹

PARAMETER	V _{CC} (Vdc)	CONDITIONS	T _{LOW} ²		+25°C			T _{HIGH} ²		Units	
			Min.	Max.	Min.	Typ.	Max.	Min.	Max.		
QUIESCENT DEVICE CURRENT 4049UB	I _{CC}	5	V _{IN} =V _{SS} or V _{DD} All valid input combinations	–	0.25	–	–	0.25	–	7.5	μAdc
		10		–	0.5	–	–	0.5	–	15.0	
		15		–	1.0	–	–	1.0	–	30.0	
QUIESCENT DEVICE CURRENT 4050B	I _{CC}	5	V _{IN} =V _{SS} or V _{DD} All valid input combinations	–	1.0	–	0.005	1.0	–	30	μAdc
		10		–	2.0	–	0.01	2.0	–	60	
		15		–	4.0	–	0.02	4.0	–	120	
OUTPUT LOW (SINK) CURRENT	I _{OL}	5	V _{OL} =0.4V V _{OL} =0.5V V _{OL} =1.5V V _{IN} =V _{SS} or V _{DD}	3.7	–	3.0	6.4	–	2.1	–	mAdc
		10		10	–	8.0	16	–	5.6	–	
		15		30	–	24.0	40	–	16.8	–	

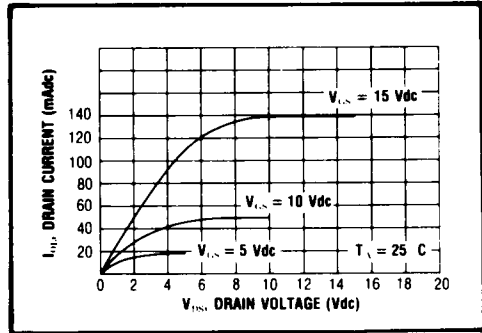
NOTES: ¹ Remaining Static Electrical Characteristics are listed under "4000B Series Family Specifications".
² T_{LOW} = -55°C for C, D, F, H device.
= -40°C for E device.
T_{HIGH} = +125°C for C, D, F, H device.
= + 85°C for E device.

DYNAMIC CHARACTERISTICS (C_L = 50pF, T_A = 25°C)

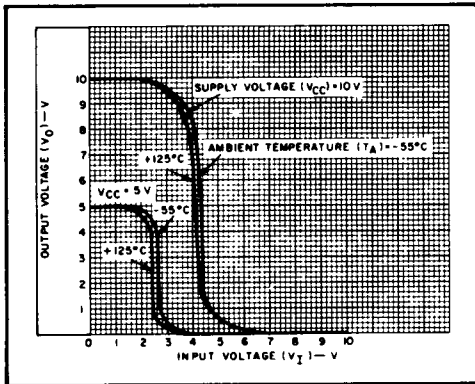
PARAMETER		V _{IN} (Vdc)	V _{CC} (Vdc)	Min.	Typ.	Max.	Units
PROPAGATION DELAY TIME 4049UB 4050B 4049UB 4050B	t _{PLH}	5	5	–	60	120	ns
		10	10	–	32	65	
		15	15	–	25	50	
		10	5	–	45	90	
		15	5	–	45	90	
		5	5	–	70	140	
	10	10	–	40	80		
	15	15	–	30	60		
	10	5	–	45	90		
	15	5	–	40	80		
	5	5	–	32	65		
	10	10	–	20	40		
15	15	–	15	30			
10	5	–	15	30			
15	5	–	10	20			
5	5	–	55	110			
10	10	–	27	55			
15	15	–	15	30			
10	5	–	50	100			
15	5	–	50	100			
OUTPUT TRANSITION TIME	t _{TLH}	5	5	–	80	160	ns
		10	10	–	40	80	
		15	15	–	30	60	
	t _{THL}	5	5	–	30	60	ns
		10	10	–	20	40	
		15	15	–	15	30	
INPUT CAPACITANCE 4049UB	C _{IN}	–	–	–	15	22.5	pF



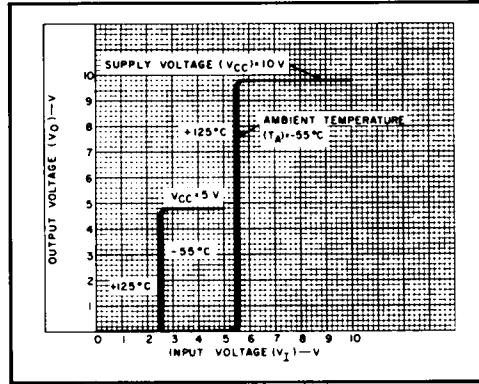
Typical P-Channel Source Current Characteristics



Typical N-Channel Sink Current Characteristics



Typical voltage transfer characteristics as a function of temperature for 4049UB.



Typical voltage transfer characteristics as a function of temperature for 4050B.