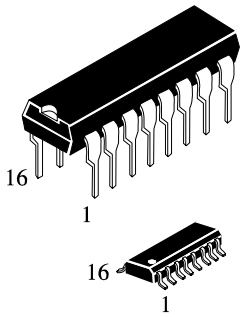
IW4050B

Hex Buffer/Converter
High-Voltage Silicon-Gate CMOS

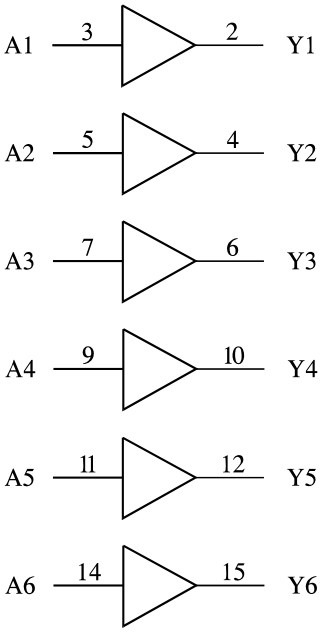


ORDERING INFORMATION
IW4050BN Plastic
IW4050BD SOIC
T_A = -55° to 125° C for all packages

The IW4050B is noninverting hex buffers and feature logic-level conversion 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.

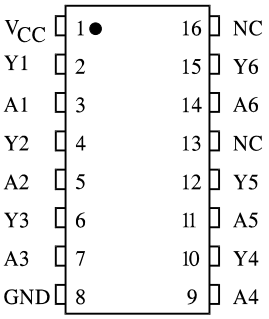
- Operating Voltage Range: 3.0 to 18 V
- Maximum input current of 1 μA at 18 V over full package-temperature range; 100 nA at 18 V and 25°C
- Noise margin (over full package temperature range):
  1.0 V min @ 5.0 V supply
  2.0 V min @ 10.0 V supply
  2.5 V min @ 15.0 V supply
- High-to-low level conversion

LOGIC DIAGRAM



PINS 13, 16 = NO CONNECTION
PIN 1 =V_{CC}
PIN 8 = GND

PIN ASSIGNMENT



NC = NO CONNECTION

FUNCTION TABLE

Inputs	Output
A	Y
L	L
H	H

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +20	V
V_{IN}	DC Input Voltage (Referenced to GND)	V_{CC}** to +18	V
V_{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V_{CC} +0.5	V
I_{IN}	DC Input Current, per Pin	±10	mA
P_D	Power Dissipation in Still Air, Plastic DIP+ SOIC Package+	750 500	mW
P_D	Power Dissipation per Output Transistor	100	mW
Tstg	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP or SOIC Package)	260	°C

*Maximum Ratings are those values beyond which damage to the device may occur.
Functional operation should be restricted to the Recommended Operating Conditions.
+Derating - Plastic DIP: - 10 mW/°C from 65° to 125°C
SOIC Package: : - 7 mW/°C from 65° to 125°C

** The IW4050B has high-to-low level voltage conversion capability but not low-to-high level; therefore it is recommended that $V_{IN} \geq V_{CC}$

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	3.0	18	V
V_{IN}	DC Input Voltage (Referenced to GND)	V_{CC}**	18	V
V_{OUT}	DC Output Voltage (Referenced to GND)	0	V_{CC}	V
T_A	Operating Temperature, All Package Types	-55	+125	°C

** The IW4050B has high-to-low level voltage conversion capability but not low-to-high level; therefore it is recommended that $V_{IN} \geq V_{CC}$

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND≤(V_{IN} or V_{OUT})≤V_{CC}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Test Conditions	V_{CC} V	Guaranteed Limit			Unit
				≥-55°C	25°C	≤125 °C	
V_{IH}	Minimum High-Level Input Voltage	V_{OUT}= V_{CC} - 0.5V V_{OUT}= V_{CC} - 1.0 V V_{OUT}= V_{CC} - 1.5V	5.0 10 15	3.5 7 11	3.5 7 11	3.5 7 11	V
V_{IL}	Maximum Low - Level Input Voltage	V_{OUT}= 0.5V V_{OUT}= 1.0 V V_{OUT}= 1.5V	5.0 10 15	1.5 3 4	1.5 3 4	1.5 3 4	V
V_{OH}	Minimum High-Level Output Voltage	V_{IN}= V_{CC}	5.0 10 15	4.95 9.95 14.95	4.95 9.95 14.95	4.95 9.95 14.95	V
V_{OL}	Maximum Low-Level Output Voltage	V_{IN}=GND	5.0 10 15	0.05 0.05 0.05	0.05 0.05 0.05	0.05 0.05 0.05	V
I_{IN}	Maximum Input Leakage Current	V_{IN}= GND or V_{CC}	18	±0.1	±0.1	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current (per Package)	V_{IN}= GND or V_{CC}	5.0 10 15 20	1 2 4 20	1 2 4 20	30 60 120 600	μA
I_{OL}	Minimum Output Low (Sink) Current	V_{IN}= GND or V_{CC} U_{OL}=0.4 V U_{OL}=0.4 V U_{OL}=0.5 V U_{OL}=1.5 V	 4.5 5 10 15	 3.3 4 10 26	 2.6 3.2 8 24	 1.8 2.4 5.6 18	mA
I_{OH}	Minimum Output High (Source) Current	V_{IN}= GND or V_{CC} U_{OH}=2.5 V U_{OH}=4.6 V U_{OH}=9.5 V U_{OH}=13.5 V	 5.0 5.0 10 15	 -2.6 -0.81 -2.0 -5.2	 -2.1 -0.65 -1.65 -4.3	 -1.55 -0.48 -1.18 -3.1	mA

AC ELECTRICAL CHARACTERISTICS (C_L=50pF, R_L=200kΩ, Input t_r=t_f=20 ns)

Symbol	Parameter	V_{IN} V	V_{CC} V	Guaranteed Limit ≥-55°C	25°C	≤125°C	Unit
t_{PLH}	Maximum Propagation Delay, Input A to Output Y (Figure 1)	5 10 10 15 15	5 10 5 15 5	140 80 90 60 80	140 80 90 60 80	280 160 180 120 160	ns
t_{PHL}	Maximum Propagation Delay, Input A to Output Y (Figure 1)	5 10 10 15 15	5 10 5 15 5	110 55 100 30 100	110 55 100 30 100	220 110 200 60 200	ns
t_{TLH}	Maximum Output Transition Time, Any Output (Figure 1)	5 10 15	5 10 15	160 80 60	160 80 60	320 160 120	ns
t_{THL}	Maximum Output Transition Time, Any Output (Figure 1)	5 10 15	5 10 15	60 40 30	60 40 30	120 80 60	ns
C_{IN}	Maximum Input Capacitance	-	-		7.5		pF

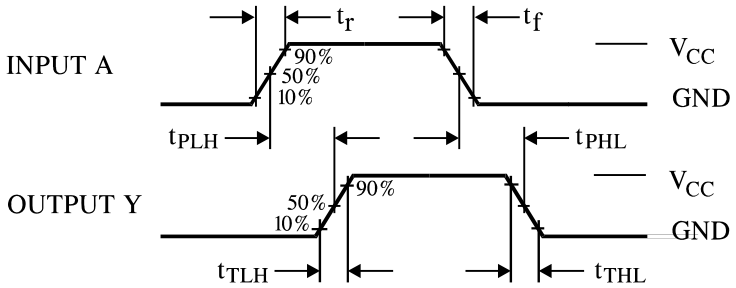
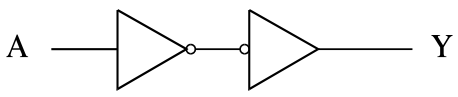
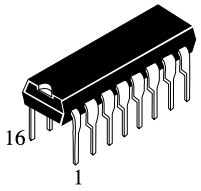


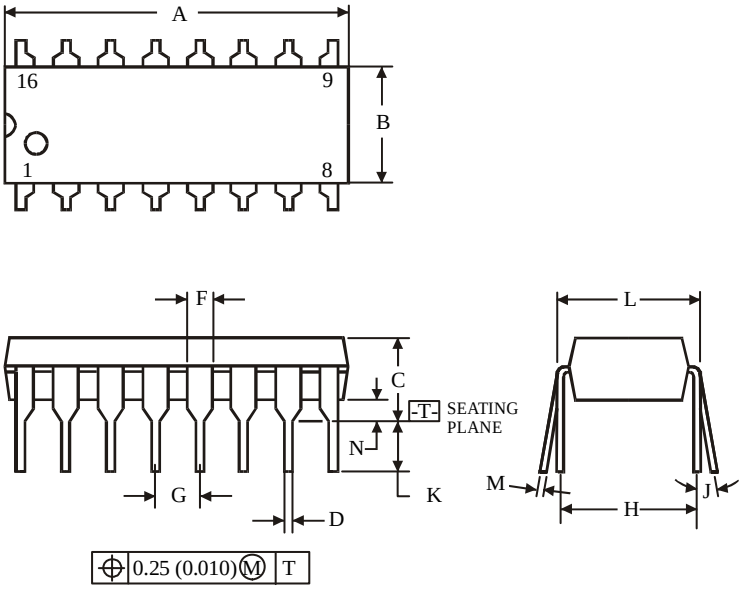
Figure 1. Switching Waveforms

EXPANDED LOGIC DIAGRAM
(1/6 of the Device)



N SUFFIX PLASTIC
(MS - 001BB)



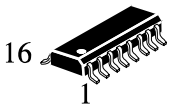


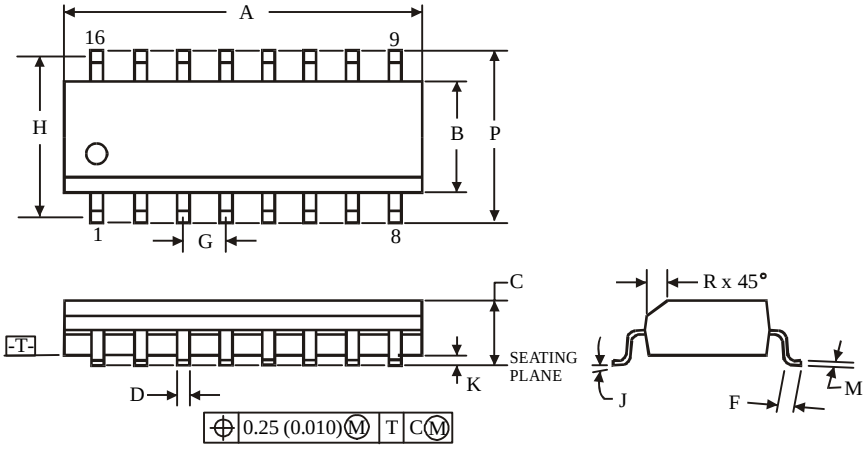
Symbol	Dimensions, mm	
	MIN	MAX
A	18.67	19.69
B	6.10	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.20	0.36
N	0.38	

NOTES:

1. imensions “A”, “B” do not include mold flash or protrusions. Maximum mold flash or protrusions 0.25 mm (0.010) per side.

D SUFFIX SOIC
(MS - 012AC)





Symbol.	Dimensions, mm	
	MIN	MAX
A	9.80	10.0
B	3.80	4.00
C	1.35	1.75
D	0.33	0.51
F	0.40	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.10	0.25
M	0.19	0.25
P	5.80	6.20
R	0.25	0.50

NOTES:

1.Dimensions A and B do not include mold flash or protrusion.
2.Maximum mold flash or protrusion 0.15 mm (0.006) per side for A, for B - 0.25 mm (0.010) per side.