

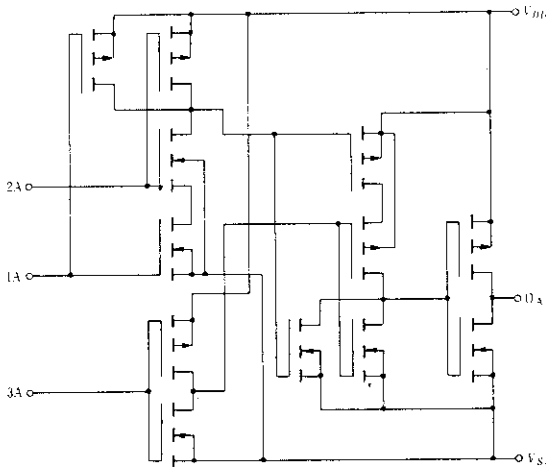
# HD14023B

## Triple 3-input NAND Gate

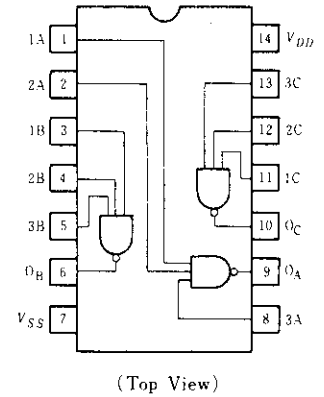
### FEATURES

- Quiescent Current = 0.5nA typ/pkg @5V
- Noise Immunity = 45% of  $V_{DD}$  typ
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range
- Pin-for Pin Replacements for CD4023B and MC14023B Series

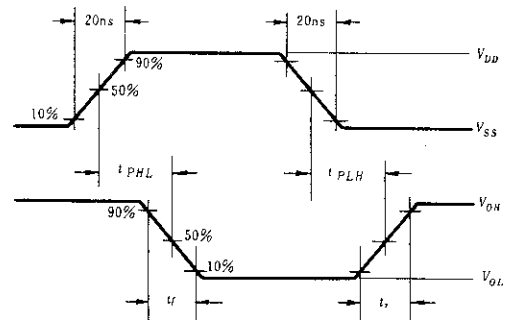
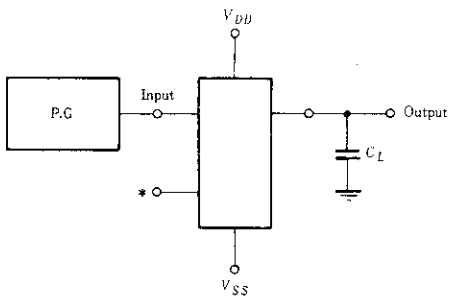
### CIRCUIT SCHEMATIC (1/3)



### PIN ARRANGEMENT



### SWITCHING TIME TEST CIRCUIT



\* All unused inputs of AND, NAND gates must be connected to  $V_{DD}$ .

**■ ELECTRICAL CHARACTERISTICS**

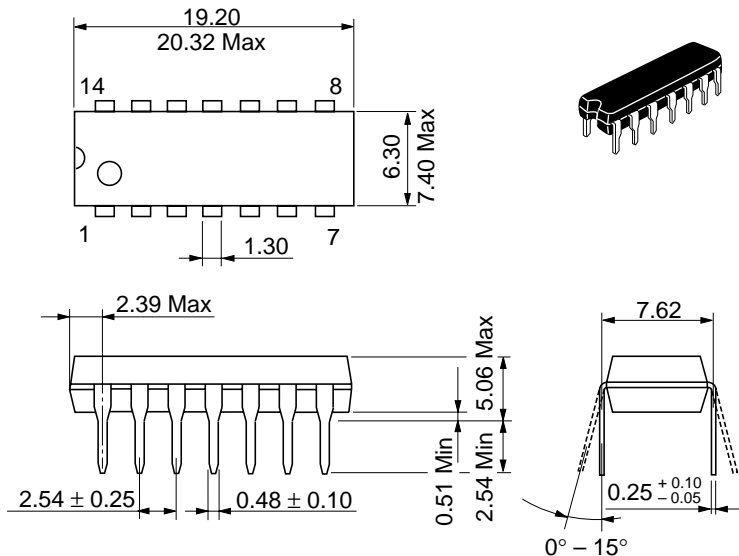
Characteristic	Symbol	$V_{DD}(V)$	Test Conditions	-40°C		25°C			85°C		Unit
				min	max	min	typ	max	min	max	
Output Voltage	$V_{OL}$	5.0	$V_{in} = V_{DD}$	-	0.05	-	0	0.05	-	0.05	V
		10		-	0.05	-	0	0.05	-	0.05	
		15		-	0.05	-	0	0.05	-	0.05	
	$V_{OH}$	5.0	$V_{in} = 0$	4.95	-	4.95	5.0	-	4.95	-	V
		10		9.95	-	9.95	10	-	9.95	-	
		15		14.95	-	14.95	15	-	14.95	-	
Input Voltage	$V_{IL}$	5.0	$V_{out} = 4.5V$	-	1.5	-	2.25	1.5	-	1.5	V
		10	$V_{out} = 9.0V$	-	3.0	-	4.50	3.0	-	3.0	
		15	$V_{out} = 13.5V$	-	4.0	-	6.75	4.0	-	4.0	
	$V_{IH}$	5.0	$V_{out} = 0.5V$	3.5	-	3.5	2.75	-	3.5	-	V
		10	$V_{out} = 1.0V$	7.0	-	7.0	5.50	-	7.0	-	
		15	$V_{out} = 1.5V$	11.0	-	11.0	8.25	-	11.0	-	
Output Drive Current	$I_{OH}$	5.0	$V_{OH} = 2.5V$	-2.5	-	-2.1	-4.2	-	-1.7	-	mA
		5.0	$V_{OH} = 4.6V$	-0.52	-	-0.44	-0.88	-	-0.36	-	
		10	$V_{OH} = 9.5V$	-1.3	-	-1.1	-2.25	-	-0.9	-	
	$I_{OL}$	15	$V_{OH} = 13.5V$	-3.6	-	-3.0	-8.8	-	-2.4	-	
		5.0	$V_{OL} = 0.4V$	0.52	-	0.44	0.88	-	0.36	-	mA
		10	$V_{OL} = 0.5V$	1.3	-	1.1	2.25	-	0.9	-	
15	$V_{OL} = 1.5V$	3.6	-	3.0	8.8	-	2.4	-			
Input Current	$I_{in}$	15		-	$\pm 0.3$	-	$\pm 0.0001$	$\pm 0.3$	-	$\pm 1.0$	$\mu A$
Input Capacitance	$C_{in}$	-	$V_{in} = 0$	-	-	-	5.0	7.5	-	-	pF
Quiescent Current	$I_{DD}$	5.0	Zero Signal, per Package	-	1.0	-	0.0005	1.0	-	7.5	$\mu A$
		10		-	2.0	-	0.0010	2.0	-	15.0	
		15		-	4.0	-	0.0015	4.0	-	30.0	
Total Supply Current*	$I_T$	5.0	Dynamic + $I_{DD}$ ,	-	-	-	0.3	-	-	-	$\mu A$
		10	per Gate,	-	-	-	0.6	-	-	-	
		15	$C_L = 50pF, f = 1 kHz$	-	-	-	0.9	-	-	-	

\* To calculate total supply current at frequency other than 1kHz.

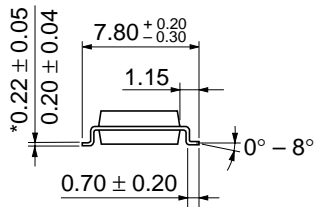
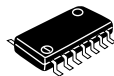
$\mu V_{DD} = 5.0V \quad I_T = 0.3 \mu A / kHz \cdot f \cdot I_{DD} / 3 \quad \mu V_{DD} = 10V \quad I_T = 0.6 \mu A / kHz \cdot f \cdot I_{DD} / 3 \quad \mu V_{DD} = 15V \quad I_T = 0.9 \mu A / kHz \cdot f + I_{DD} / 2$

**■ SWITCHING CHARACTERISTICS ( $C_L = 50pF, T_a = 25^\circ C$ )**

Characteristic	Symbol	$V_{DD}(V)$	min	typ	max	Unit
Output Rise Time	$t_r$	5.0	-	100	200	ns
		10	-	50	100	
		15	-	40	80	
Output Fall Time	$t_f$	5.0	-	100	200	ns
		10	-	50	100	
		15	-	40	80	
Propagation Delay Time	$t_{PLH}$	5.0	-	160	320	ns
		10	-	65	130	
		15	-	50	100	
	$t_{PHL}$	5.0	-	160	320	ns
		10	-	65	130	
		15	-	50	100	

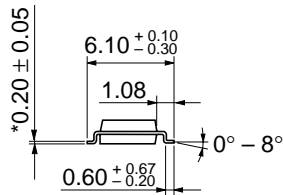


Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.97 g



Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.23 g

\*Dimension including the plating thickness  
Base material dimension



Hitachi Code	FP-14DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.13 g

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## Hitachi, Ltd.

Semiconductor & Integrated Circuits.  
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan  
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

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## For further information write to:

Hitachi Semiconductor  
(America) Inc.  
179 East Tasman Drive,  
San Jose, CA 95134  
Tel: <1> (408) 433-1990  
Fax: <1> (408) 433-0223

Hitachi Europe GmbH  
Electronic components Group  
Dornacher Straße 3  
D-85622 Feldkirchen, Munich  
Germany  
Tel: <49> (89) 9 9180-0  
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.  
Electronic Components Group.  
Whitebrook Park  
Lower Cookham Road  
Maidenhead  
Berkshire SL6 8YA, United Kingdom  
Tel: <44> (1628) 585000  
Fax: <44> (1628) 778322

Hitachi Asia Pte. Ltd.  
16 Collyer Quay #20-00  
Hitachi Tower  
Singapore 049318  
Tel: 535-2100  
Fax: 535-1533

Hitachi Asia Ltd.  
Taipei Branch Office  
3F, Hung Kuo Building, No.167,  
Tun-Hwa North Road, Taipei (105)  
Tel: <886> (2) 2718-3666  
Fax: <886> (2) 2718-8180

Hitachi Asia (Hong Kong) Ltd.  
Group III (Electronic Components)  
7/F., North Tower, World Finance Centre,  
Harbour City, Canton Road, Tsim Sha Tsui,  
Kowloon, Hong Kong  
Tel: <852> (2) 735 9218  
Fax: <852> (2) 730 0281  
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