

# HD14093B

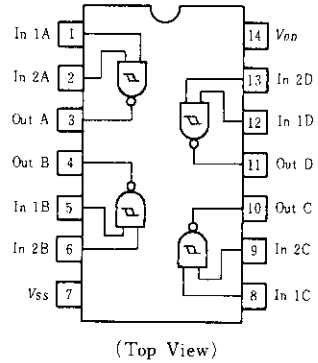
## Quadruple 2-input NAND Schmitt Trigger

The HD14093B Schmitt trigger finds primary use where low power dissipation and/or high noise immunity is desired. The HD14093B may be used in place of the HD14011B quad 2-input NAND gate for enhanced noise immunity or to "square up" slowly changing waveforms.

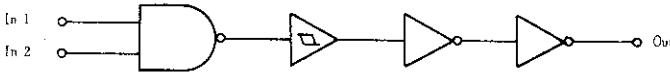
### FEATURES

- Quiescent Current = 0.5nA/pkg typ. @5V
- Supply Voltage Range = 3 to 18V
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range
- Double Diode Protection on All Inputs
- Pin-for-Pin Compatible with CD4093 and MC14093B
- Can be Used to Replace HD14011B

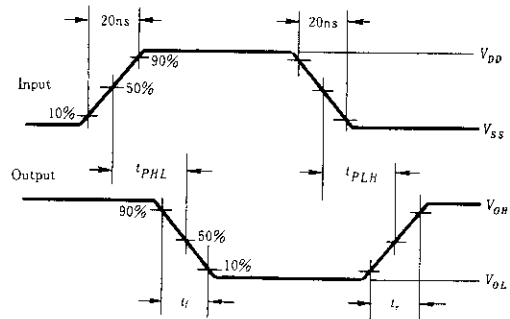
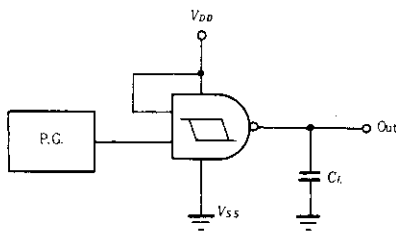
### PIN ARRANGEMENT



### LOGIC DIAGRAM (1/4)



### SWITCHING TIME TEST CIRCUIT



■ ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	V <sub>DD</sub> (V)	Test Conditions	-40°C		25°C			85°C		Unit
				min	max	min	typ	max	min	max	
Output Voltage	V <sub>OL</sub>	5.0	V <sub>in</sub> =V <sub>DD</sub> or 0	-	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 <sub>OH</sub>	5.0	V <sub>in</sub> =0 or V <sub>DD</sub>	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 <sub>IL</sub>	5.0	V <sub>out</sub> =9.0 or 1.0V	-	1.5	-	2.25	1.5	-	1.5	V
		10	V <sub>out</sub> =9.0 or 1.0V	-	3.0	-	4.50	3.0	-	3.0	
		15	V <sub>out</sub> =13.5 or 1.5V	-	4.0	-	6.75	4.0	-	4.0	
	V <sub>IH</sub>	5.0	V <sub>out</sub> =0.5 or 4.5V	3.5	-	3.5	2.75	-	3.5	-	V
		10	V <sub>out</sub> =1.0 or 9.0V	7.0	-	7.0	5.50	-	7.0	-	
		15	V <sub>out</sub> =1.5 or 13.5V	11.0	-	11.0	8.25	-	11.0	-	
Output Drive Current	I <sub>OH</sub>	5.0	V <sub>OH</sub> =2.5V	-2.5	-	-2.1	-4.2	-	-1.7	-	mA
		5.0	V <sub>OH</sub> =4.6V	-0.52	-	-0.44	-0.88	-	-0.36	-	
		10	V <sub>OH</sub> =9.5V	-1.3	-	-1.1	-2.25	-	-0.9	-	
	I <sub>OL</sub>	5.0	V <sub>OL</sub> =0.4V	0.52	-	0.44	0.88	-	0.36	-	mA
		10	V <sub>OL</sub> =0.5V	1.3	-	1.1	2.25	-	0.9	-	
		15	V <sub>OL</sub> =1.5V	3.6	-	3.0	8.8	-	2.4	-	
Input Current	I <sub>in</sub>	15		-	±0.3	-	±0.0001	±0.3	-	±1.0	μA
Input Capacitance	C <sub>in</sub>	-	V <sub>in</sub> =0	-	-	-	5.0	7.5	-	-	pF
Quiescent Current	I <sub>DD</sub>	5.0	Zero Signal, per Package	-	1.0	-	0.0005	1.0	-	7.5	μA
		10		-	2.0	-	0.0010	2.0	-	15	
		15		-	4.0	-	0.0015	4.0	-	30	
Total Supply Current*	I <sub>T</sub>	5.0	Dynamic +I <sub>DD</sub> , per Gate, C <sub>L</sub> =50pF f=1kHz	-	-	-	1.2	-	-	-	μA
		10		-	-	-	2.4	-	-	-	
		15		-	-	-	3.6	-	-	-	
Hysteresis Voltage	V <sub>H</sub>	5.0		0.20	0.42	0.17	0.26	0.39	0.13	0.39	V
		10		0.29	0.65	0.25	0.38	0.60	0.20	0.60	
		15		0.39	1.00	0.33	0.5	0.90	0.27	0.90	
Threshold Voltage	V <sub>T+</sub>	5.0		1.90	4.15	1.80	2.70	4.05	1.70	4.05	V
		10		3.05	6.75	2.95	4.43	6.65	2.85	6.65	
		15		4.12	9.15	4.02	6.03	9.05	3.92	9.05	
	V <sub>T-</sub>	5.0		1.63	3.76	1.63	2.44	3.66	1.53	3.66	
		10		2.70	6.18	2.70	4.05	6.08	2.60	6.08	
		15		3.59	8.40	3.69	5.53	8.38	3.70	8.30	

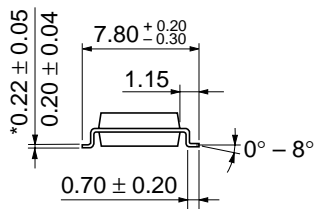
\* To calculate total supply current at frequency other than 1kHz.  
 @V<sub>DD</sub>=5.0V I<sub>T</sub>=(1.2μA/kHz)f+I<sub>DD</sub>, @V<sub>DD</sub>=10V I<sub>T</sub>=(2.4μA/kHz)f+I<sub>DD</sub>=15V I<sub>T</sub>=(3.6μA/kHz)f+I<sub>DD</sub>

■ SWITCHING CHARACTERISTICS (C<sub>L</sub>=50pF, T<sub>a</sub>=25°C)

Characteristic	Symbol	V <sub>DD</sub> (V)	min	typ	max	Unit
Output Rise Time	t <sub>r</sub>	5.0	-	100	200	ns
		10	-	50	100	
		15	-	40	80	
Output Fall Time	t <sub>f</sub>	5.0	-	100	200	ns
		10	-	50	100	
		15	-	40	80	
Propagation Delay Time	t <sub>PLH</sub> , t <sub>PHL</sub>	5.0	-	125	250	ns
		10	-	50	100	
		15	-	40	80	



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

## 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

URL      North America      : <http://semiconductor.hitachi.com/>  
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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  
Telex: 40815 HITEC HX

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