

# HD14502B

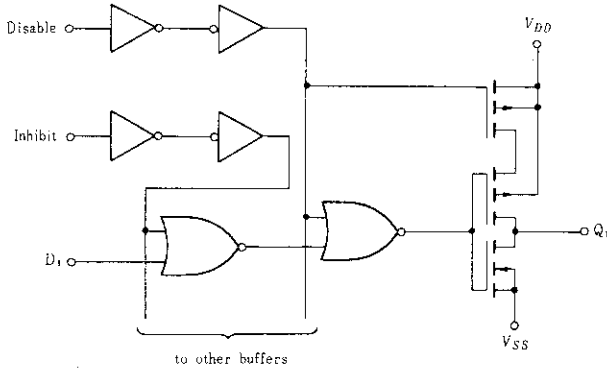
## Strobed Hex Inverter/Buffer

The HD14502B is a strobe hex buffer/Inverter with 3-state output, an inhibit control, and guaranteed TTL drive over the temperature range. The 3-state output simplifies design by allowing a common bus.

### FEATURES

- Quiescent Current = 2nA/pkg typ. @5V
- 3-state Output
- Output Impedance = 200Ω @5V Supply Guaranteed Over Full Temperature Range
- Supply Voltage Range = 3 to 18V
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range

### LOGIC DIAGRAM

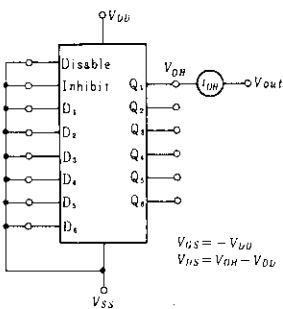


### MAXIMUM RATINGS (Voltages referenced to $V_{SS}$ )

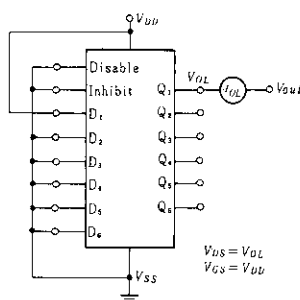
Characteristic	Symbol	Value	Unit
DC Supply Voltage	$V_{DD}$	-0.5 ~ +18	V
Input Voltage	$V_{in}$	-0.5 ~ $V_{DD} + 0.5$	V
DC Current Drain per Input Pin	$I_{in}$	10	mA
DC Current Drain per Output Pin	$I_{out}$	30	mA
Operating Temperature Range	$T_A$	-40 ~ +85	°C
Storage Temperature Range	$T_{stg}$	-65 ~ +150	°C
Power Dissipation	$P_D$	300	mW

### DC CHARACTERISTIC TEST CIRCUIT

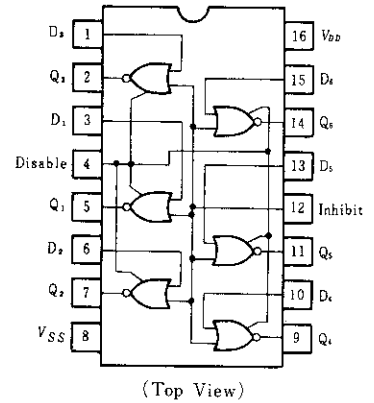
#### $I_{OH}$



#### $I_{OL}$



### PIN ARRANGEMENT

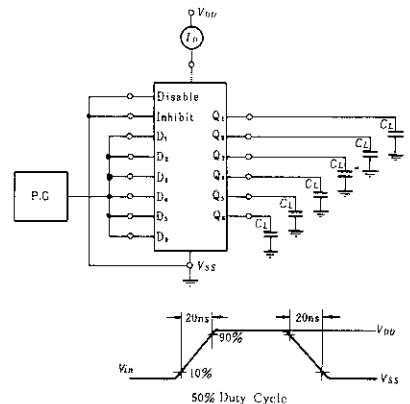


### TRUTH TABLE

$D_n$	Inhibit	Disable	$Q_n$
0	0	0	1
1	0	0	0
X	1	0	0
X	X	1	High Impedance

X = Don't Care

### POWER DISSIPATION TEST CIRCUIT AND WAVEFORM



## 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	$V_{in} = V_{DD}$ 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	
	$V_{OH}$	5.0	$V_{in} = 0$ or $V_{DD}$	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	$V_{out} = 4.5$ or $0.5V$	-	1.5	-	2.25	1.5	-	1.5	V
		10	$V_{out} = 9.0$ or $1.0V$	-	3.0	-	4.50	3.0	-	3.0	
		15	$V_{out} = 13.5$ or $1.5V$	-	4.0	-	6.75	4.0	-	4.0	
	$V_{IH}$	5.0	$V_{out} = 0.5$ or $4.5V$	3.5	-	3.5	2.75	-	3.5	-	V
		10	$V_{out} = 1.0$ or $9.0V$	7.0	-	7.0	5.50	-	7.0	-	
		15	$V_{out} = 1.5$ or $13.5V$	11.0	-	11.0	8.25	-	11.0	-	
Output Drive Current	$I_{OH}$	5.0	$V_{OH} = 2.5V$	-1.0	-	-0.8	-1.7	-	-0.6	-	mA
		5.0	$V_{OH} = 4.6V$	-0.2	-	-0.16	-0.36	-	-0.12	-	
		10	$V_{OH} = 9.5V$	-0.5	-	-0.4	-0.9	-	-0.3	-	
		15	$V_{OH} = 13.5V$	-1.4	-	-1.2	-3.5	-	-1.0	-	
	$I_{OL}$	5.0	$V_{OL} = 0.4V$	2.3	-	1.9	6.6	-	1.6	-	mA
		10	$V_{OL} = 0.5V$	5.0	-	4.2	17	-	3.4	-	
15		$V_{OL} = 1.5V$	19	-	16	66	-	13	-		
Input Current	$I_{in}$	15		-	$\pm 0.3$	-	$\pm 0.00001$	$\pm 0.3$	-	$\pm 1.0$	$\mu A$
Input Capacitance	$C_{in}$		$V_{in} = 0$	-	-	-	5.0	7.5	-	-	pF
Quiescent Current	$I_{DD}$	5.0	Zero Signal, per Package	-	4.0	-	0.002	4.0	-	30	$\mu A$
		10		-	8.0	-	0.004	8.0	-	60	
		15		-	16	-	0.006	16	-	120	
Total Supply Current*	$I_T$	5.0	Dynamic $+I_{DL}$ , per Gate $C_L = 50pF, f = 1kHz$	-	-	-	2.7	-	-	-	$\mu A$
		10		-	-	-	5.3	-	-	-	
		15		-	-	-	8.0	-	-	-	
Three-State Output Leakage Current	$I_{TL}$	15		-	$\pm 1.0$	-	$\pm 0.00001$	$\pm 1.0$	-	$\pm 7.5$	$\mu A$

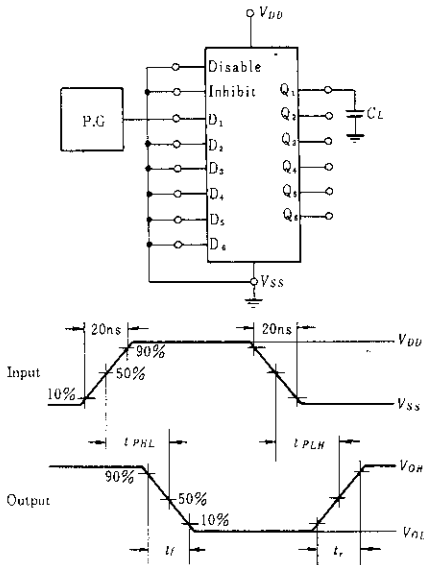
\* To calculate total supply current at frequency other than 1kHz.

@  $V_{DD} = 5.0V$   $I_T = (2.7\mu A/kHz) \cdot f + I_{DD}$  @  $V_{DD} = 10V$   $I_T = (5.3\mu A/kHz) \cdot f + I_{DD}$  @  $V_{DD} = 15V$   $I_T = (8.0\mu A/kHz) \cdot f + I_{DD}$

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

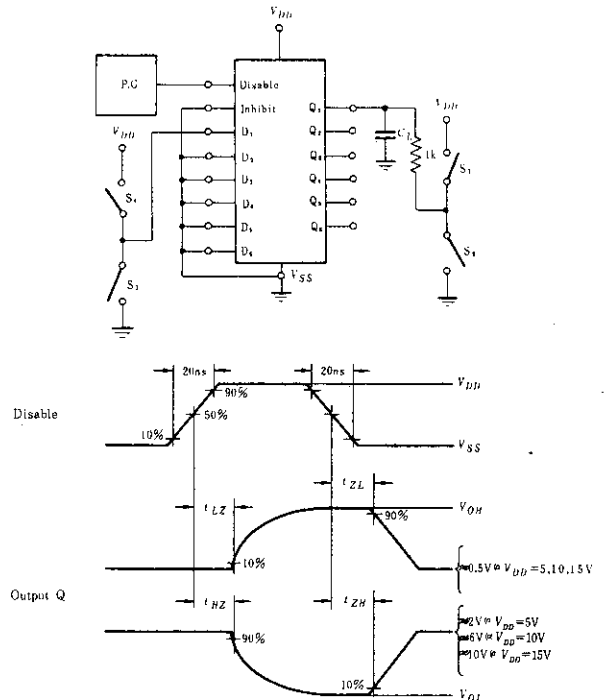
Characteristic	Symbol	$V_{DD}(\text{V})$	min	typ	max	Unit
Output Rise Time	$t_r$	5.0	—	180	360	ns
		10	—	90	180	
		15	—	65	130	
Output Fall Time	$t_f$	5.0	—	60	100	ns
		10	—	30	60	
		15	—	20	40	
Propagation Delay Time	$t_{PHL}$	5.0	—	350	590	ns
		10	—	140	260	
		15	—	100	190	
	$t_{PLH}$	5.0	—	295	590	ns
		10	—	130	260	
		15	—	95	190	
Output Enable Time	$t_{ZH}$	5.0	—	260	520	ns
		10	—	105	210	
		15	—	80	160	
	$t_{ZL}$	5.0	—	160	320	ns
		10	—	65	130	
		15	—	50	100	
Output Disable Time	$t_{HZ}$	5.0	—	80	130	ns
		10	—	60	110	
		15	—	55	100	
	$t_{LZ}$	5.0	—	150	300	ns
		10	—	70	140	
		15	—	55	110	

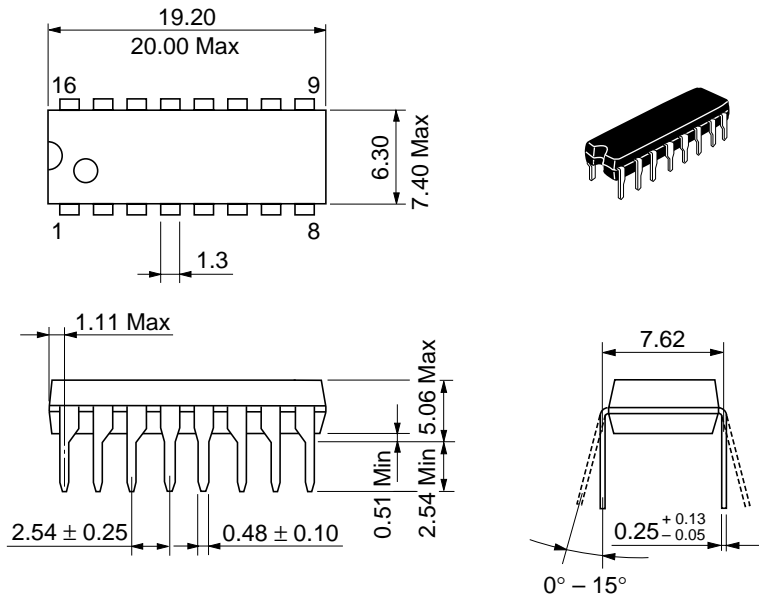
■ AC TEST CIRCUIT



■ TESTING METHOD

Item	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>
$t_{HZ}$	Open	Closed	Closed	Open
$t_{LZ}$	Closed	Open	Open	Closed
$t_{ZL}$	Closed	Open	Open	Closed
$t_{ZH}$	Open	Closed	Closed	Open





Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g

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