

# HD14070B, HD14077B

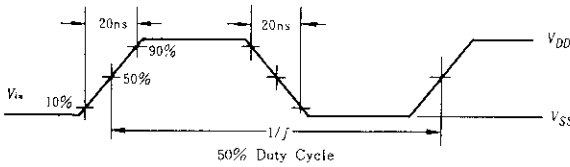
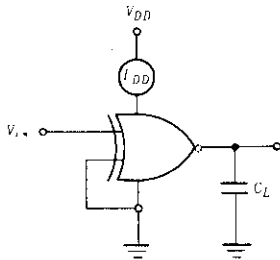
Quadruple Exclusive-OR Gate.....HD14070B

Quadruple Exclusive-NOR Gate.....HD14077B

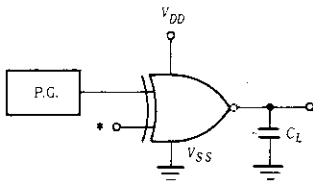
## FEATURES

- 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 CD4070B/77B and MC14070B/77B Series

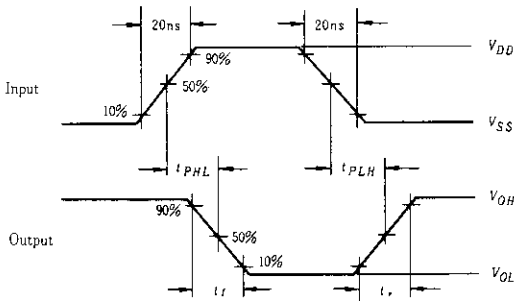
## POWER DISSIPATION TEST CIRCUIT AND WAVEFORM



## SWITCHING TIME TEST CIRCUIT

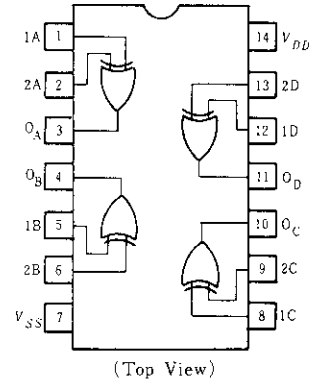


\* Connect unused input to  $V_{DD}$  for HD14070B, to  $V_{SS}$  for HD14077B

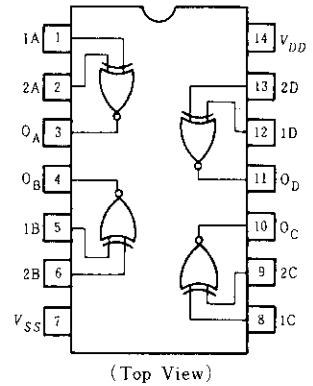


## PIN ARRANGEMENT

### HD14070B



### HD14077B



## 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	$V_{iA}=V_{DD}$ 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	$V_{iA}=0$ 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	$V_{oA}=4.5$ or $0.5V$	-	1.5	-	2.25	1.5	-	1.5	V	
		10		$V_{oA}=9.0$ or $1.0V$	-	3.0	-	4.50	3.0	-		3.0
		15		$V_{oA}=13.5$ or $1.5V$	-	4.0	-	6.75	4.0	-		4.0
	$V_{iH}$	5.0	$V_{oA}=0.5$ or $4.5V$	3.5	-	3.5	2.75	-	3.5	-	V	
		10		$V_{oA}=1.0$ or $9.0V$	7.0	-	7.0	5.50	-	7.0		-
		15		$V_{oA}=1.5$ or $13.5V$	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		-
		15		$V_{OH}=13.5V$	-3.6	-	-3.0	-8.8	-	-2.4		-
	$I_{OL}$	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	$I_{iA}$	15		-	$\pm 0.3$	-	$\pm 0.0001$	$\pm 0.3$	-	$\pm 1.0$	$\mu A$	
Input Capacitance	$C_{iA}$		$V_{iA}=0$	-	-	-	5.0	7.5	-	-	pF	
Quiescent Current	$I_{DD}$	5.0	Zero Signal, per Ppckage	-	1.0	-	0.0005	1.0	-	7.5	$\mu A$	
		10		-	2.0	-	0.0010	2.0	-	15		
		15		-	4.0	-	0.0015	4.0	-	30		
Total Supply Current*	$I_T$	5.0	Dynamic+ $I_{DD}$ , per Gate, $C_L=50pF$ , $f=1kHz$	-	-	-	0.3	-	-	-	$\mu A$	
		10		-	-	-	0.6	-	-	-		
		15		-	-	-	0.9	-	-	-		

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

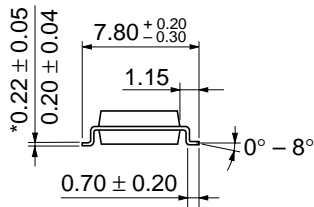
©  $V_{DD}=5.0V$   $I_T=(0.3\mu A/kHz)/f+I_{DD}$  ©  $V_{DD}=10V$   $I_T=(0.6\mu A/kHz)/f+I_{DD}$  ©  $V_{DD}=15V$   $I_T=(0.9\mu A/kHz)/f+I_{DD}$

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

Characteristic	Symbol	$V_{DD}(V)$	-40°C		25°C			85°C		Unit
			min	max	min	typ	max	min	max	
Output Rise and Fall Time	$t_r$	5.0	-	-	-	100	200	-	-	ns
		10	-	-	-	50	100	-	-	
		15	-	-	-	40	80	-	-	
	$t_f$	5.0	-	-	-	100	200	-	-	ns
		10	-	-	-	50	100	-	-	
		15	-	-	-	40	80	-	-	
Propagation Delay Time	$t_{PLH}$	5.0	-	-	-	175	350	-	-	ns
		10	-	-	-	75	150	-	-	
		15	-	-	-	50	100	-	-	
	$t_{PHL}$	5.0	-	-	-	175	350	-	-	ns
		10	-	-	-	75	150	-	-	
		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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