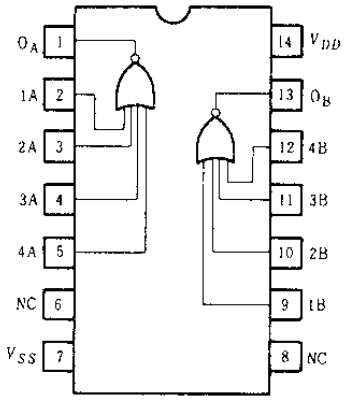
HD14002B

Dual 4-input NOR Gate

■ PIN ARRANGEMENT

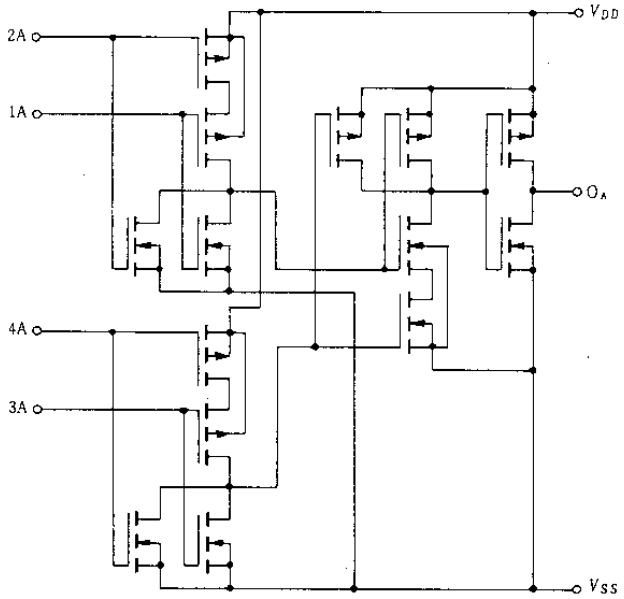


(Top View)

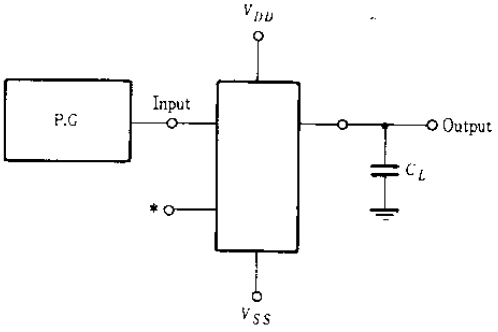
■ FEATURES

- 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 CD4002B and MC14002B Series

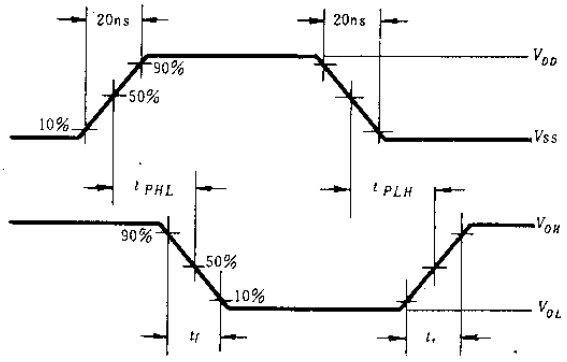
■ CIRCUIT SCHEMATIC (1/2)



■ SWITCHING TIME TEST CIRCUIT



* All Unused inputs of OR, NOR gates must be connected to V_{SS}



■ ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	V_{DD}(V)	Test Conditions	−40°C min	−40°C max	25°C min	25°C typ	25°C max	85°C min	85°C max	Unit
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	−	
		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_{in}	15		−	±0.3	−	±0.00001	±0.3	−	±1.0	μA
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	μA
		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}, C_L=50pF per Gate, f=1kHz	−	−	−	0.3	−	−	−	μA
		10		−	−	−	0.6	−	−	−	
		15		−	−	−	0.9	−	−	−	

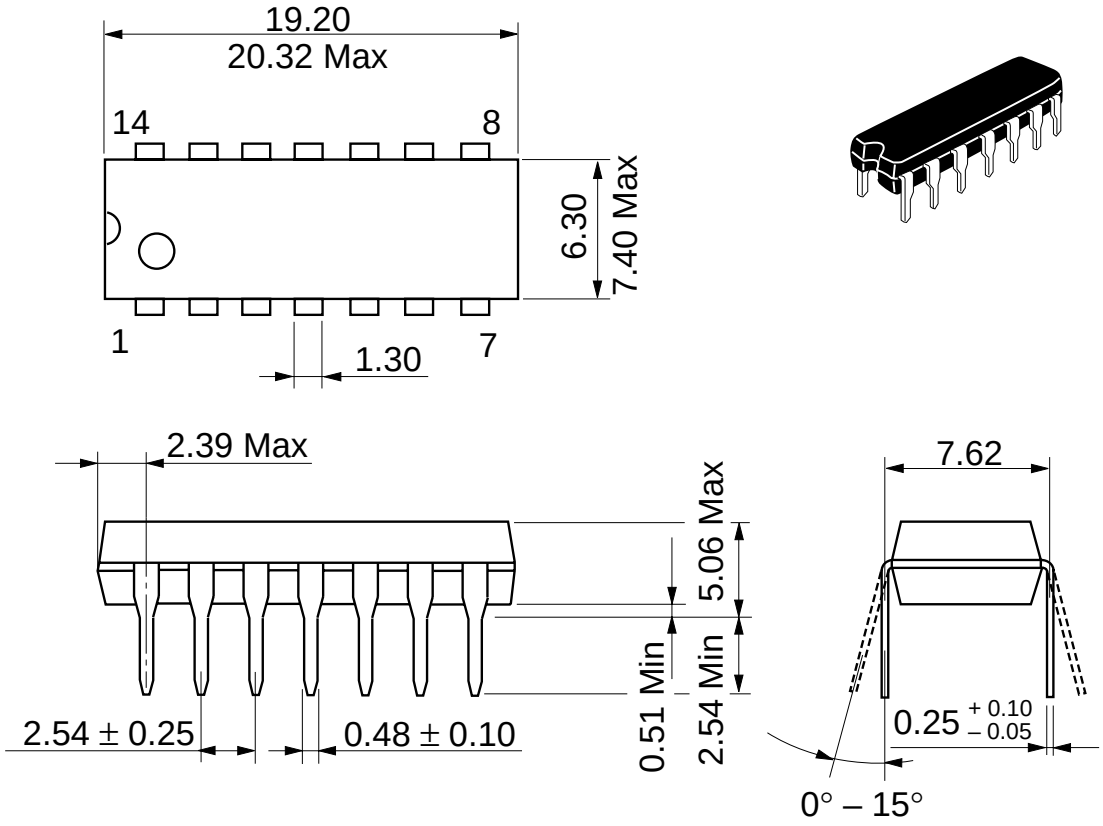
* To calculate total supply current at frequency other than 1kHz.

@ $V_{DD}=5.0V$ $I_T=(0.3\mu A/kHz)f+I_{DD}/2$ @ $V_{DD}=10V$ $I_T=(0.6\mu A/kHz)f+I_{DD}/2$ @ $V_{DD}=15V$ $I_T=(0.9\mu A/kHz)f+I_{DD}/2$

■ SWITCHING CHARACTERISTICS (C_L=50pF, Ta=25°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	

Unit: mm



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

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