

HD14501UB

Triple Gate

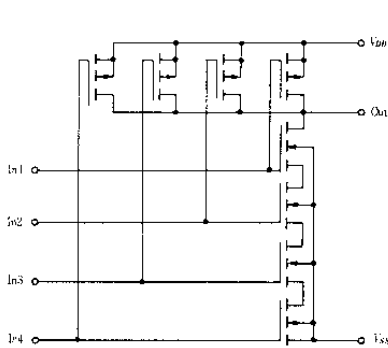
- (Dual 4-input NAND Gate)
- (2-input NOR/OR Gate)
- (8-input AND/NAND Gate)

FEATURES

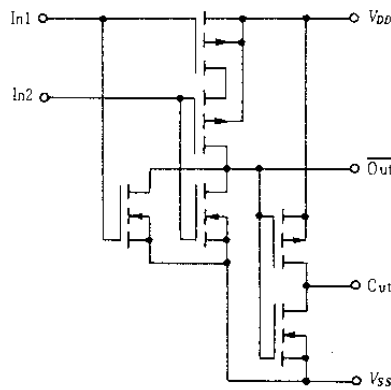
- Quiescent Current = 0.5nA typ/pkg @5V
- Noise Immunity = 45% of V_{DD} typ
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range
- Pin-for Pin Replacements for MC14501UB Series

CIRCUIT SCHEMATIC

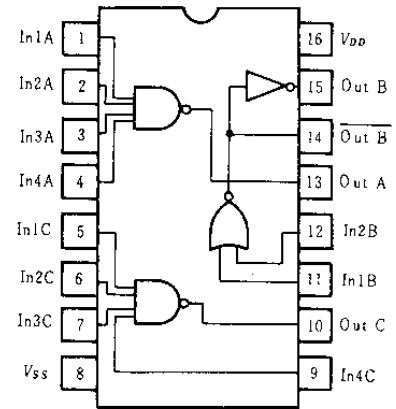
4-input NAND Gate



2-input NOR/OR Gate

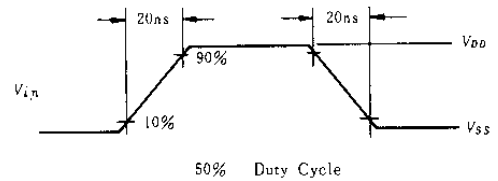
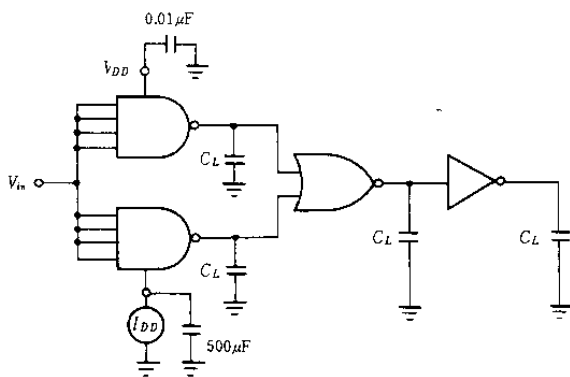


PIN ARRANGEMENT



(Top View)

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	-	1.0	-	2.25	1.0	-	1.0	V		
		10	V _{out} =9.0 or 1.0V	-	2.0	-	4.50	2.0	-	2.0			
		15	V _{out} =13.5 or 1.5V	-	2.5	-	6.75	2.5	-	2.5			
	V _{IH}	5.0	V _{out} =0.5 or 4.5V	4.0	-	4.0	2.75	-	4.0	-	V		
		10	V _{out} =1.0 or 9.0V	8.0	-	8.0	5.50	-	8.0	-			
		15	V _{out} =1.5 or 13.5V	12.5	-	12.5	8.25	-	12.5	-			
Output Drive Current	NAND	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	-		
	NOR	I _{OH}	5.0	V _{OH} =2.5V	-1.68	-	-1.4	-3.0	-	-1.05	-		
			5.0	V _{OH} =4.6V	-0.34	-	-0.28	-0.63	-	-0.21	-		
			10	V _{OH} =9.5V	-0.84	-	-0.7	-1.58	-	-0.52	-		
			15	V _{OH} =13.5V	-2.52	-	-2.1	-6.12	-	-1.57	-		
	NOR-Inverter	I _{OH}	5.0	V _{OH} =2.5V	-2.88	-	-2.4	-5.1	-	-1.8	-		
			5.0	V _{OH} =4.6V	-0.58	-	-0.48	-1.08	-	-0.36	-		
			10	V _{OH} =9.5V	-1.44	-	-1.2	-2.7	-	-0.9	-		
			15	V _{OH} =13.5V	-4.32	-	-3.6	-10.5	-	-2.7	-		
	NAND	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	-		
			5.0	V _{OL} =0.4V	0.79	-	0.66	1.32	-	0.54	-		
			10	V _{OL} =0.5V	1.98	-	1.65	3.37	-	1.36	-		
			15	V _{OL} =1.5V	5.4	-	4.5	13.2	-	3.57	-		
5.0			V _{OL} =0.4V	1.32	-	1.1	2.2	-	0.90	-			
10			V _{OL} =0.5V	3.3	-	2.75	5.63	-	2.27	-			
NOR-Inverter	I _{OL}	5.0	V _{OL} =0.4V	1.32	-	1.1	2.2	-	0.90	-			
		10	V _{OL} =0.5V	3.3	-	2.75	5.63	-	2.27	-			
NOR-Inverter	I _{OL}	15	V _{OL} =1.5V	9.0	-	7.5	22.0	-	5.95	-			
		15	V _{OL} =1.5V	9.0	-	7.5	22.0	-	5.95	-			
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	-	0.5	-	0.0005	0.5	-	3.8	μA		
		10		-	1.0	-	0.0010	1.0	-	7.5			
		15		-	2.0	-	0.0015	2.0	-	15			
Total Supply Current*	I _T	5.0	Dynamic + I _{DD} , per Gate	-	-	-	1.2	-	-	-	μA		
		10		-	-	-	2.4	-	-	-			
		15		-	-	-	3.6	-	-	-			

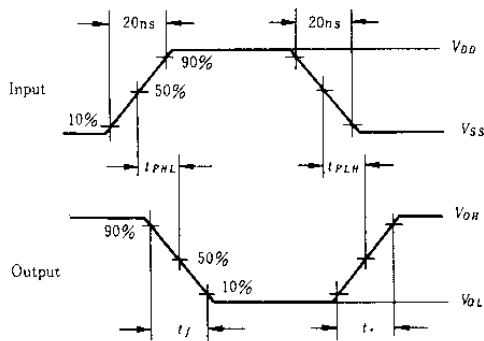
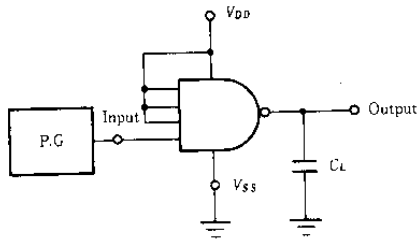
* To calculate total supply current at frequency other than 1kHz.
 Ⓔ V_{DD}=5.0V I_T=(1.2μA/kHz)/f+I_{DD}. Ⓕ V_{DD}=10V I_T=(2.4μA/kHz)/f+I_{DD}. Ⓖ V_{DD}=15V I_T=(3.6μA/kHz)/f+I_{DD}

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

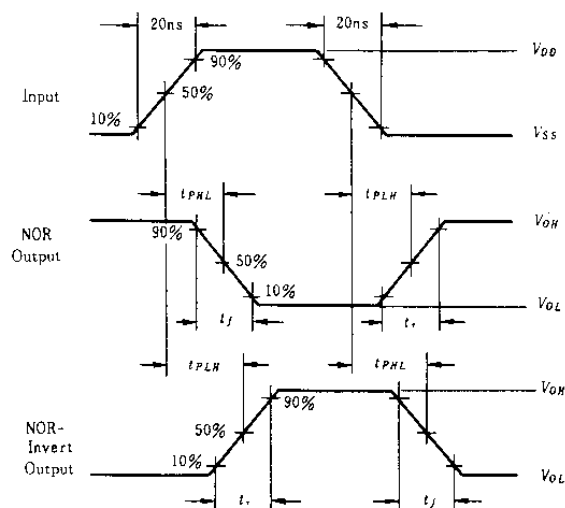
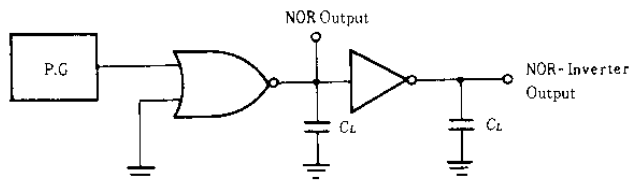
Characteristic		Symbol	Test Circuit	$V_{DD}(\text{V})$	min	typ	max	Unit
Output Rise Time	NAND, NOR	t_r	1, 2	5.0	—	180	400	ns
				10	—	90	200	
				15	—	65	160	
	NOR- Inverter		2	5.0	—	100	200	
				10	—	50	100	
				15	—	37	80	
Output Fall Time	NAND, NOR	t_f	1, 2	5.0	—	100	200	ns
				10	—	50	100	
				15	—	37	80	
	NOR- Inverter		2	5.0	—	60	140	
				10	—	40	100	
				15	—	30	75	
Propagation Delay Time	NAND	t_{PLH} , t_{PHL}	1	5.0	—	130	300	ns
				10	—	70	175	
				15	—	50	125	
	NOR		2	5.0	—	115	250	
				10	—	65	160	
				15	—	45	100	
NOR- Inverter	2	5.0	—	130	300			
		10	—	70	175			
		15	—	50	125			

■ SWITCHING TIME TEST CIRCUIT

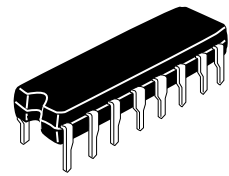
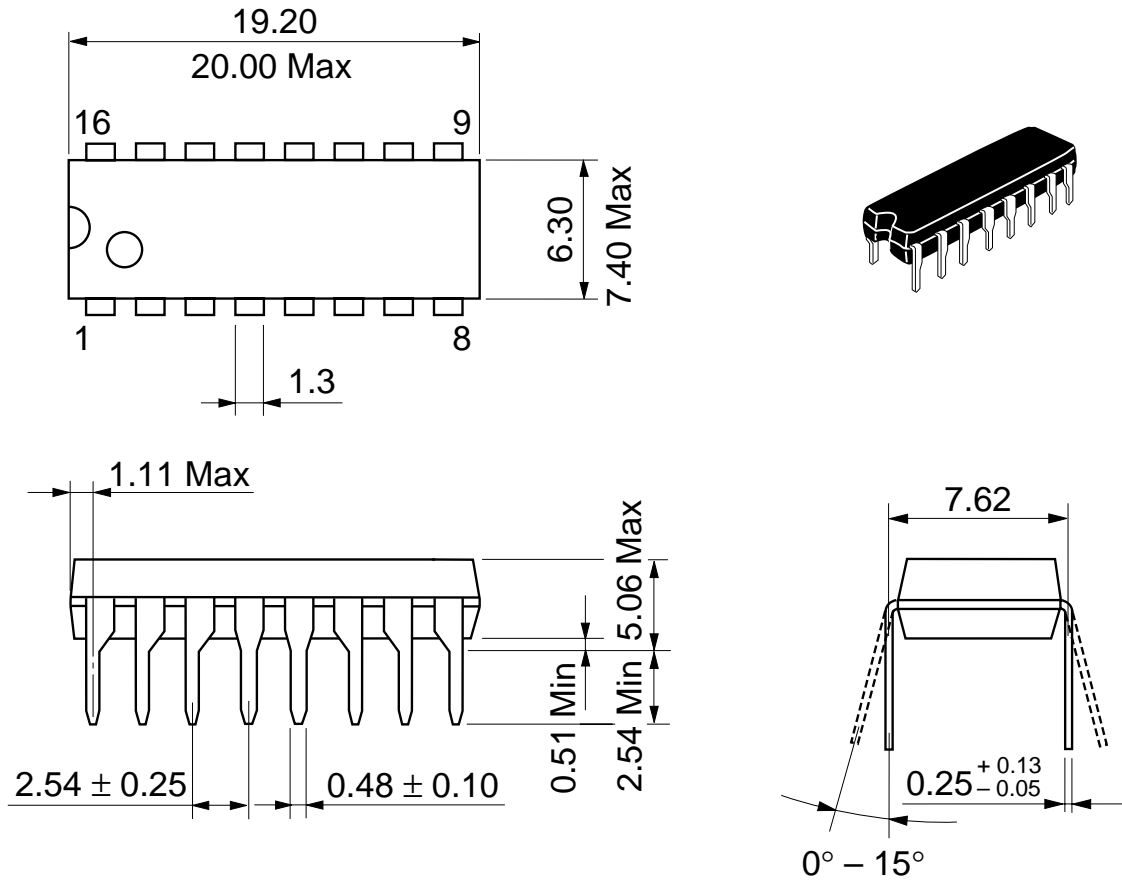
1. NAND Gate



2. NOR Gate, NOR-Inverter



Unit: mm



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

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