

HD14501UB

Triple Gate

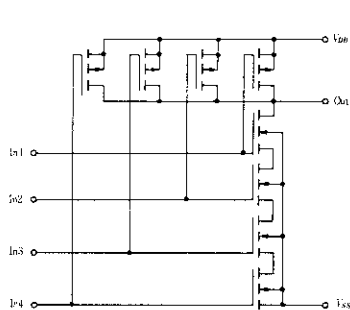
- (Dual 4-input NAND Gate)
- 2-input NOR/OR Gate
- 8-input AND/NAND Gate

FEATURES

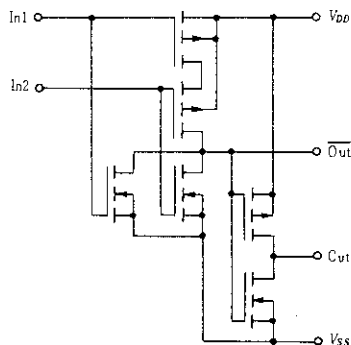
- Quiescent Current = 0.5nA typ/pkg @5V
- Noise Immunity = 45% of V_{DD} typ
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range
- Pin-for Pin Replacements for MC14501UB Series

CIRCUIT SCHEMATIC

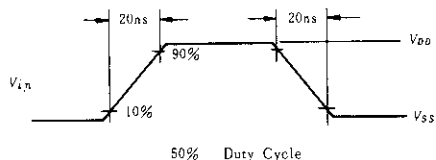
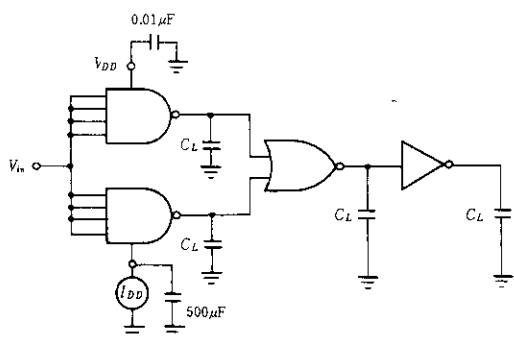
4-input NAND Gate



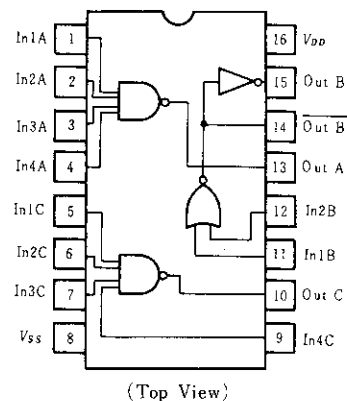
2-input NOR/OR Gate



POWER DISSIPATION TEST CIRCUIT AND WAVEFORM



PIN ARRANGEMENT



■ 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	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	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	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	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	—	
	NOR	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	—	
	NOR-Inverter	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	—	
		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	per Gate	—	—	—	2.4	—	—	—	
		15	$C_L = 50pF$, $f = 1kHz$	—	—	—	3.6	—	—	—	

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

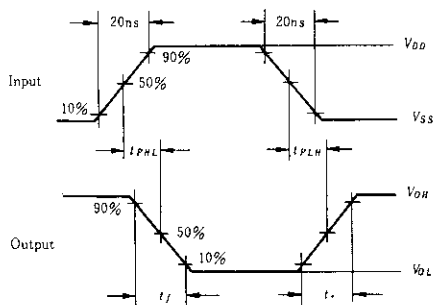
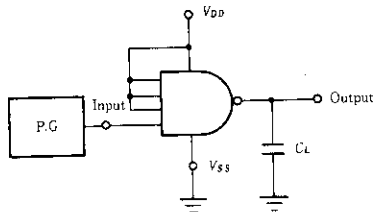
⑥ $V_{DD} = 5.0V$ $I_T = (1.2\mu A/kHz)f + I_{DD}$, ⑦ $V_{DD} = 10V$ $I_T = (2.4\mu A/kHz)f + I_{DD}$, ⑧ $V_{DD} = 15V$ $I_T = (3.6\mu A/kHz)f + I_{DD}$

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

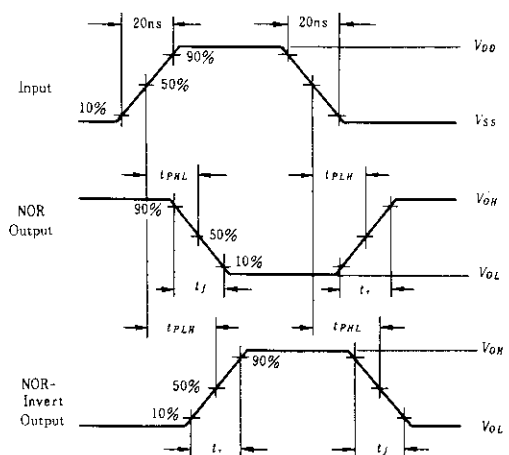
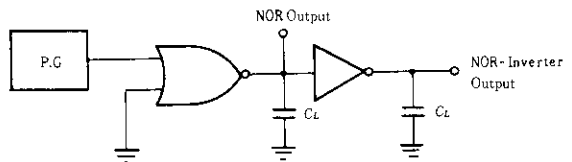
Characteristic		Symbol	Test Circuit	$V_{DD}(\text{V})$	min	typ	max	Unit
Output Rise Time	NAND, NOR	t_r	1, 2	5.0	—	180	400	ns
				10	—	90	200	
				15	—	65	160	
	NOR- Inverter		2	5.0	—	100	200	
				10	—	50	100	
				15	—	37	80	
Output Fall Time	NAND, NOR	t_f	1, 2	5.0	—	100	200	ns
				10	—	50	100	
				15	—	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	

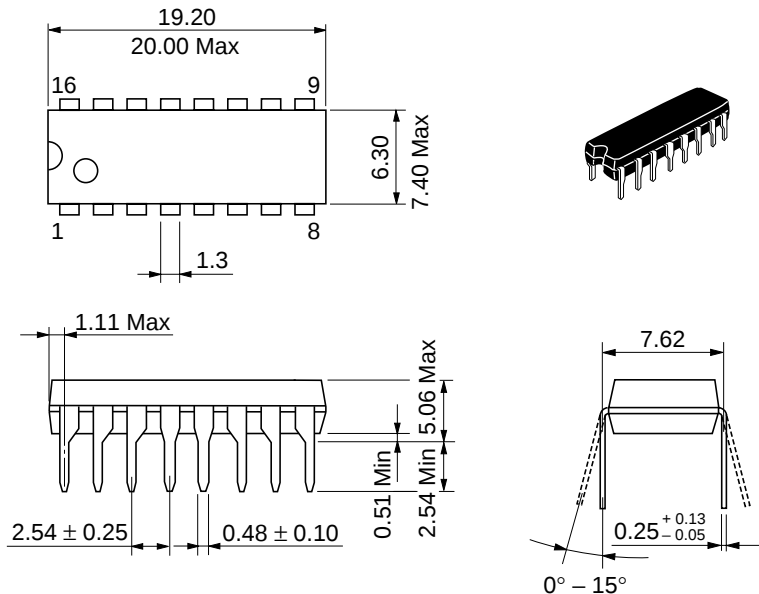
■ SWITCHING TIME TEST CIRCUIT

1. NAND Gate



2. NOR Gate, NOR-Inverter





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

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