



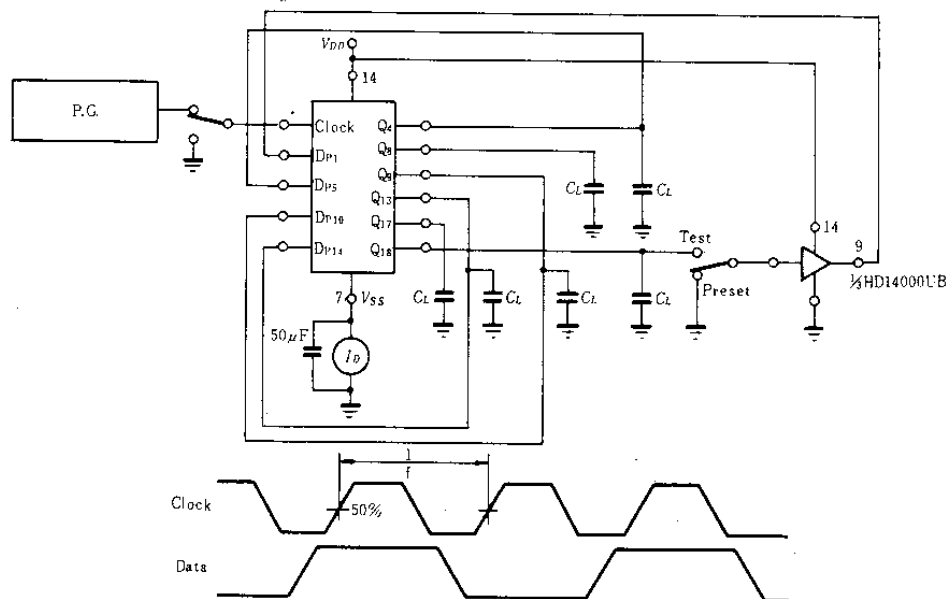
**ELECTRICAL CHARACTERISTICS**

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	—	
	$I_{OL}$	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		—	$\pm 0.3$	—	$\pm 0.0001$	$\pm 0.3$	—	$\pm 1.0$	$\mu A$
Input Capacitance	$C_{in}$	—	$V_{in} = 0$	—	—	—	5.0	7.5	—	—	pF
Quiescent Current	$I_{DD}$	5.0	Zero Signal, per Package	—	20	—	0.005	20	—	150	$\mu A$
		10		—	40	—	0.010	40	—	300	
		15		—	80	—	0.015	80	—	600	
Total Supply Current*	$I_T$	5.0	Dynamic + $I_{DD}$ ,	—	—	—	1.3	—	—	$\mu A$	
		10	Per Gate,	—	—	—	2.6	—	—		
		15	$C_L = 50pF, f = 1kHz$	—	—	—	3.9	—	—		

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

@ $V_{DD} = 5.0V$   $I_T = (1.3\mu A/kHz)f + I_{DD}$ , @ $V_{DD} = 10V$   $I_T = (2.6\mu A/kHz)f + I_{DD}$ , @ $V_{DD} = 15V$   $I_T = (3.9\mu A/kHz)f + I_{DD}$

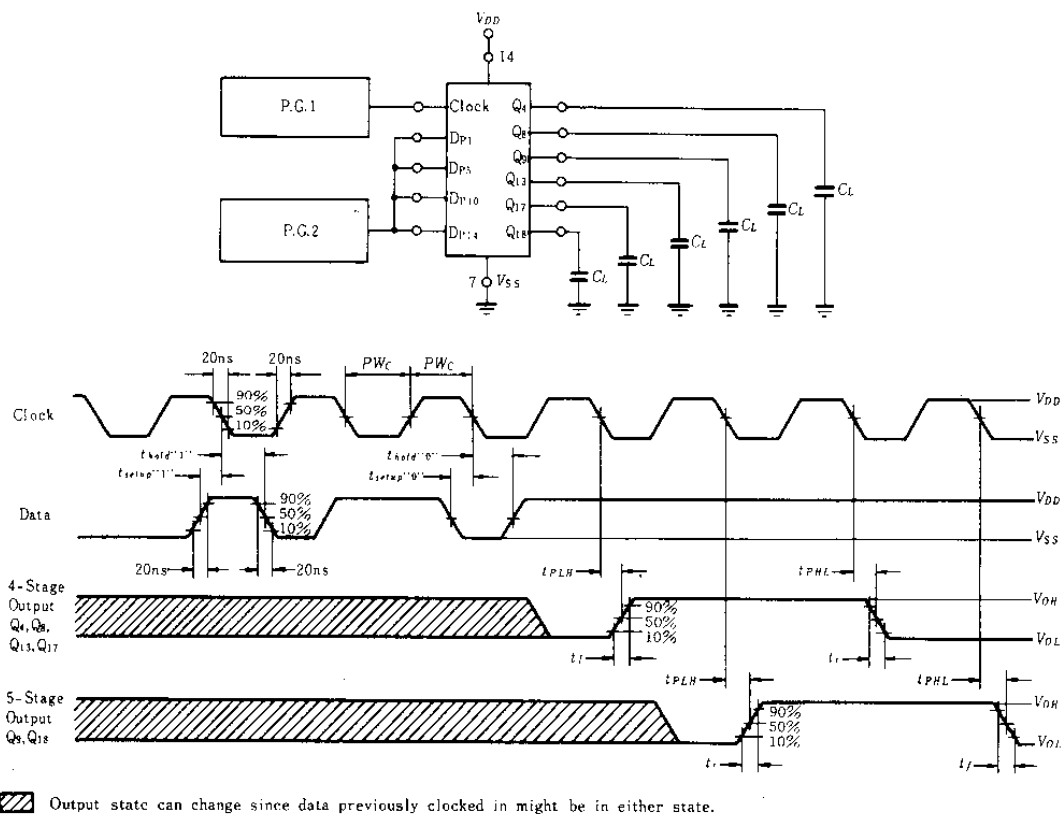
**POWER DISSIPATION TEST CIRCUIT AND WAVEFORM**



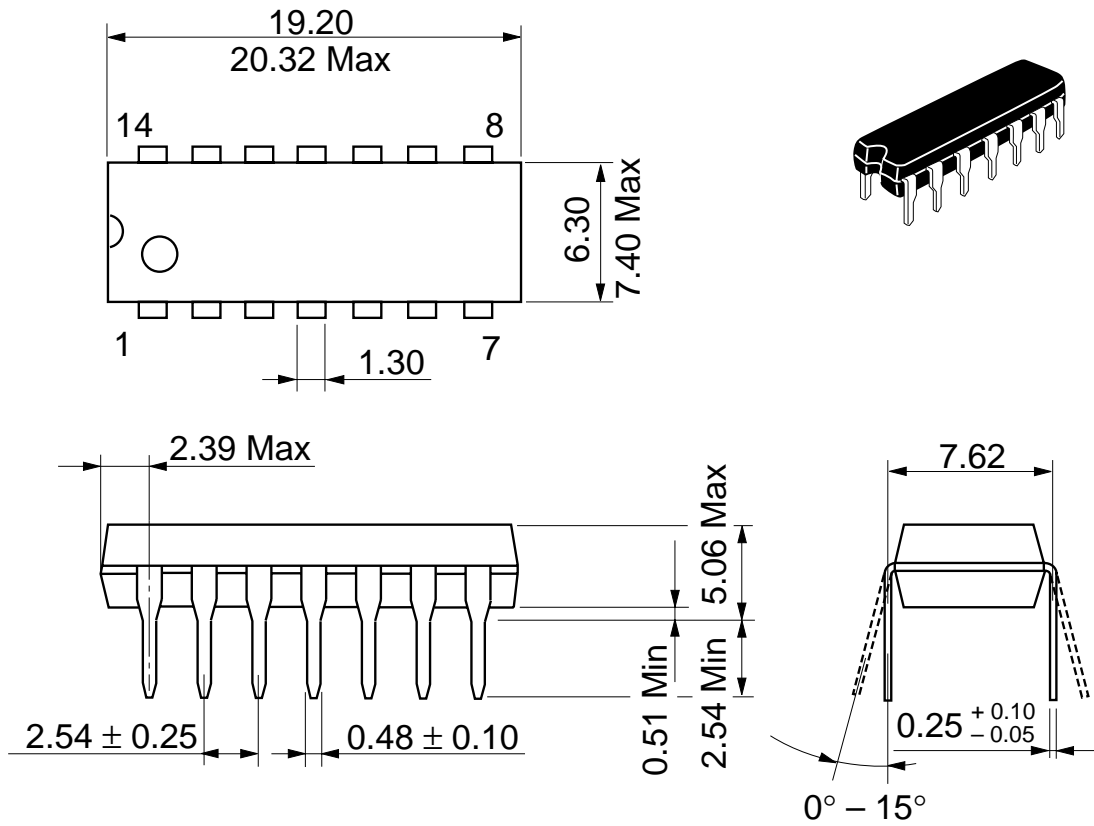
■ SWITCHING CHARACTERISTICS ( $C_L=50\text{pF}$ ,  $T_a=25^\circ\text{C}$ )

Characteristic	Symbol	$V_{DD}$ (V)	min	typ	max	Unit
Output Rise Time	$t_r$	5.0	—	180	400	ns
		10	—	90	200	
		15	—	65	160	
Output Fall Time	$t_f$	5.0	—	100	200	ns
		10	—	50	100	
		15	—	37	80	
Propagation Delay Time	$t_{PLH}$	5.0	—	305	600	ns
		10	—	110	275	
	$t_{PHL}$	15	—	80	200	
Clock Pulse Width	$PW_C$	5.0	250	100	—	ns
		10	125	60	—	
		15	95	40	—	
Clock Pulse Frequency	$PRF$	5.0	—	5.0	2.0	MHz
		10	—	8.3	4.0	
		15	—	12	6.0	
Clock Pulse Rise and Fall Time	$t_r, t_f$	5.0	—	—	15	$\mu\text{s}$
		10	—	—	15	
		15	—	—	15	
Setup Time	$t_{setup}$	5.0	0	-50	—	ns
		10	0	-15	—	
		15	0	-8.0	—	
Hold Time	$t_{hold}$	5.0	220	75	—	ns
		10	110	25	—	
		15	90	20	—	

■ SWITCHING TIME TEST CIRCUIT



Unit: mm



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

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