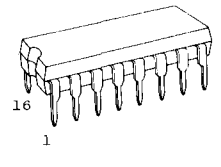
HEX BUS BUFFER
TC74HC367P NON-INVERTING
TC74HC368P INVERTING

GENERAL DESCRIPTION

The TC74HC367 and TC74HC368 are high speed CMOS 3-STATE BUS BUFFERs fabricated with silicon gate C^2MOS technology.
These devices achieve the high speed operation similar to equivalent LSTTL, while maintaining the CMOS low power dissipation. These devices contain six buffers, and four buffers are controlled by a enable input ($\overline{G1}$) and the other two buffers are controlled by the other enable input ($\overline{G2}$); these outputs of each buffer group are enabled when $\overline{G1}$ and/or $\overline{G2}$ inputs are held low, and when held high these outputs are disabled to be high-impedance.
These outputs are capable of driving up to 15 LSTTL.
The designer has a choise of non-inverting outputs (HC367) and inverting outputs (HC368).
All outputs are equipped with protection circuits against static discharge or transient excess voltage.

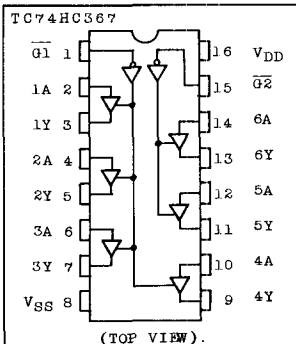
FEATURES:

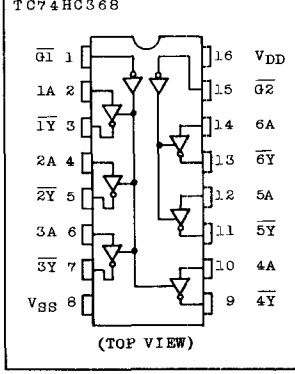
- High Speed ..... t_{pd}=16ns(Typ.) at V_{CC}=5V
- Low Power Dissipation ..... I_{CC}=4μA(Max.) at Ta=25°C
- High Noise Immunity ..... $V_{NIH}=V_{NIL}$=28% V_{CC}(Min.)
- Output Drive Capability ..... 15 LSTTL Loads
- Symmetrical Output Impedance ..... $|I_{OH}|=I_{OL}$= 6 mA
- Balanced Propagation Delays ..... $t_{pLH}\fallingdotseq t_{pHL}$
- Wide Operating Voltage Range ..... $V_{CC(opr.)}$=2V ~ 6V
- Pin and Function Compatible with 74LS367/368



DIP (5-22E)

PIN ASSIGNMENT





TRUTH TABLE

INPUTS		OUTPUTS	
$\overline{G}$	An	Yn(367)	$\overline{Yn}$(368)
L	L	L	H
L	H	H	L
H	X	Z	Z

X : DON'T CARE
Z : HIGH IMPEDANCE

ABSOLUTE MAXIMUM RATINGS

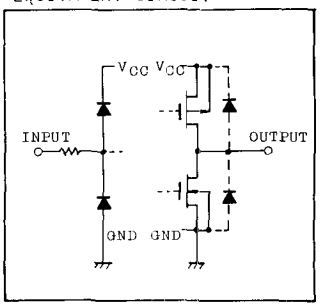
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7$	V
DC Input Voltage	V_{IN}	$-0.5 \sim V_{CC}+0.5$	V
DC Output Voltage	V_{OUT}	$-0.5 \sim V_{CC}+0.5$	V
Input Diode Current	I_{IK}	±20	mA
Output Diode Current	I_{OK}	±20	mA
DC Output Current	I_{OUT}	±35	mA
DC V_{CC}/Ground Current	I_{CC}	±70	mA
Power Dissipation	P_D	500*	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	°C
Lead Temperature 10sec	T_L	300	°C

* 500mW in the range of Ta=-40° ∿ 65°C and from Ta=65°C up to 85°C derating factor of -10mW/°C shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	LIMIT	UNIT
Supply Voltage	V_{CC}	$2 \sim 6$	V
Input Voltage	V_{IN}	$0 \sim V_{CC}$	V
Output Voltage	V_{OUT}	$0 \sim V_{CC}$	V
Operating Temperature	T_{opr}	$-40 \sim 85$	°C
Input Rise and Fall Time	t_r, t_f	$0 \sim 1000$ (V_{CC}=2.0V) $0 \sim 500$ (V_{CC}=4.5V) $0 \sim 400$ (V_{CC}=6.0V)	ns

INPUT and OUTPUT EQUIVALENT CIRCUIT



DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		Ta=25°C			Ta=-40∿85°C		UNIT
			V_{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Input Voltage	V_{IH}		2.0	1.5	-	-	1.5	-	V
			4.5	3.15	-	-	3.15	-	
			6.0	4.2	-	-	4.2	-	
Low-Level Input Voltage	V_{IL}		2.0	-	-	0.5	-	0.5	V
			4.5	-	-	1.35	-	1.35	
			6.0	-	-	1.8	-	1.8	

DC ELECTRICAL CHARACTERISITCS (Continued)

PARAMETER	SYMBOL	TEST CONDITION		V_{CC}	Ta=25°C MIN.	Ta=25°C TYP.	Ta=25°C MAX.	Ta=-40~85°C MIN.	Ta=-40~85°C MAX.	UNIT
High-Level Output Voltage	V_{OH}	$V_{IN}=V_{IH}$ or V_{IL}	I_{OH}=-20μA	2.0	1.9	2.0	-	1.9	-	V
				4.5	4.4	4.5	-	4.4	-	
				6.0	5.9	6.0	-	5.9	-	
			I_{OH}=-6mA	4.5	4.18	4.31	-	4.13	-	
			I_{OH}=-7.8mA	6.0	5.68	5.80	-	5.63	-	
Low-Level Output Voltage	V_{OL}	$V_{IN}=V_{IH}$ or V_{IL}	I_{OL}=20μA	2.0	-	0.0	0.1	-	0.1	V
				4.5	-	0.0	0.1	-	0.1	
				6.0	-	0.0	0.1	-	0.1	
			I_{OL}=6mA	4.5	-	0.17	0.32	-	0.37	
			I_{OL}=7.8mA	6.0	-	0.18	0.32	-	0.37	
3-State Output Off-State Current	I_{OZ}	$V_{IN}=V_{IH}$ or V_{IL} $V_{OUT}=V_{CC}$ or GND		6.0	-	-	±0.5	-	±5.0	μA
Input Leakage Current	I_{IN}	$V_{IN}=V_{CC}$ or GND		6.0	-	-	±0.1	-	±1.0	
Quiescent Supply Current	I_{CC}	$V_{IN}=V_{CC}$ or GND		6.0	-	-	4.0	-	40.0	

AC ELECTRICAL CHARACTERISTICS (C_L=50pF, INPUT $t_r=t_f$=6ns)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	Ta=25°C MIN.	Ta=25°C TYP.	Ta=25°C MAX.	Ta=-40~85°C MIN.	Ta=-40~85°C MAX.	UNIT
Output Transition Time	t_{TLH}		2.0	-	30	60	-	75	ns
			4.5	-	8	12	-	15	
	t_{THL}		6.0	-	7	10	-	13	
Propagation Delay Time	t_{pLH}		2.0	-	65	135	-	165	
			4.5	-	17	27	-	33	
	t_{pHL}		6.0	-	15	23	-	28	
Output Enable Time	t_{pZL}		2.0	-	80	150	-	180	
			4.5	-	19	30	-	36	
	t_{pZH}		6.0	-	17	26	-	31	
Output Disable Time	t_{pLZ}		2.0	-	90	195	-	235	
			4.5	-	25	39	-	47	
	t_{pHZ}		6.0	-	23	34	-	41	
Input Capacitance	C_{IN}			-	5	10	-	10	pF
Output Capacitance	C_{OUT}			-	10	-	-	-	

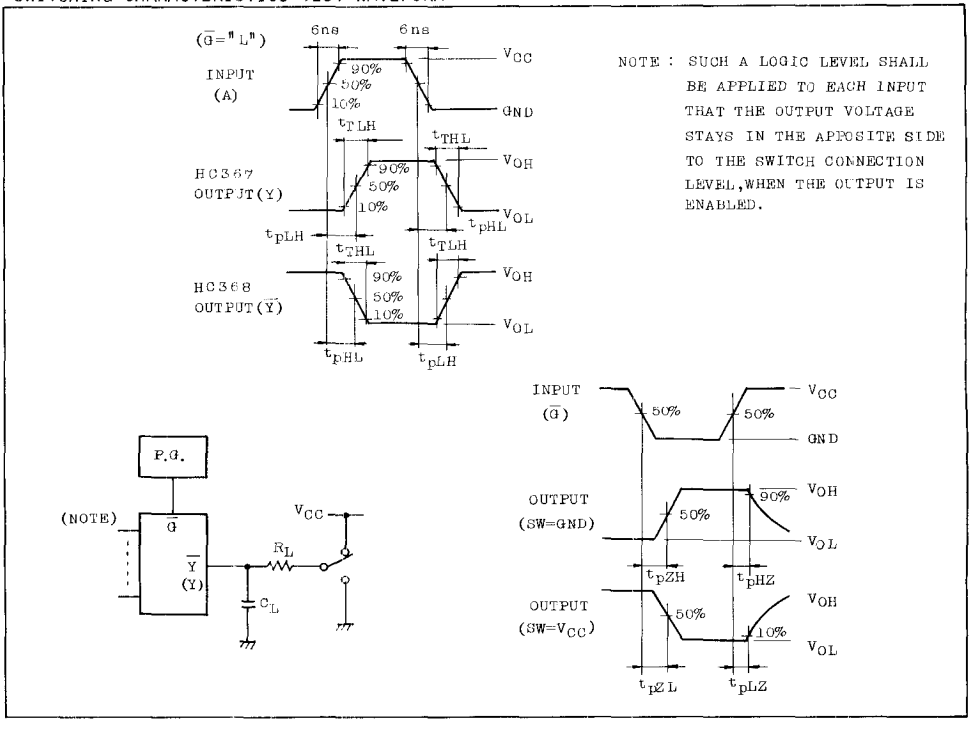
AC ELECTRICAL CHACTERISTICS (Continued)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	Ta=25°C MIN.	Ta=25°C TYP.	Ta=25°C MAX.	Ta=-40∿85°C MIN.	Ta=-40∿85°C MAX.	UNIT
Power Dissipation Capacitance	C_{PD}(1)	TC74HC367		-	32	-	-	-	pF
		TC74HC368		-	29	-	-	-	

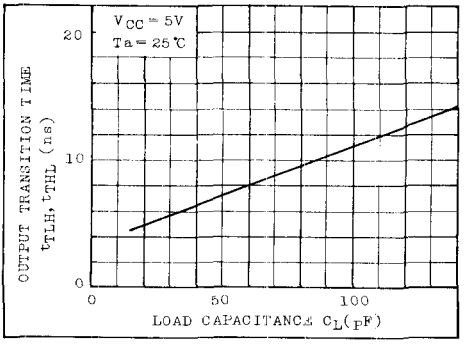
Note (1) C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit). Average operating current can be obtained by the equation hereunder

$$I_{CC(opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/6 \quad \text{(Per Cricuit)}$$

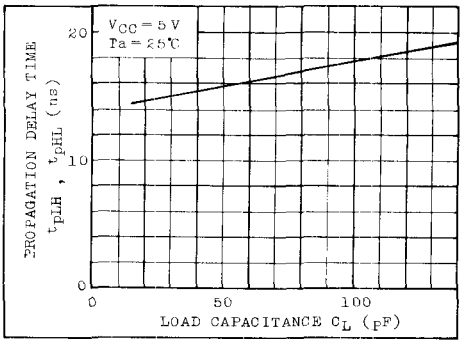
SWITCHING CHARACTERISTICS TEST WAVEFORM



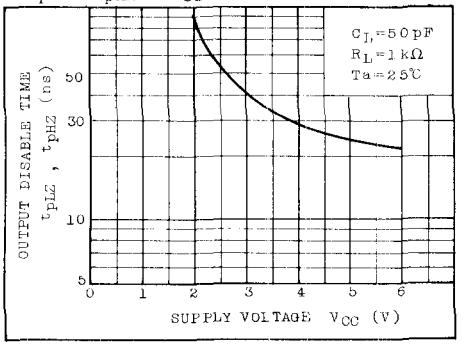
t_{TLH}, t_{THL} - C_L CHARACTERISTICS (TYP.)



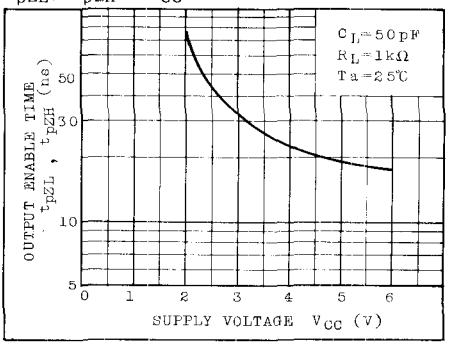
t_{PLH}, t_{PHL} - C_L CHARACTERISTICS (TYP.)



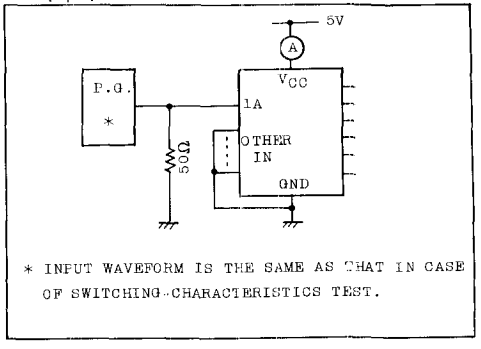
t_{pLZ}, t_{pHZ} - V_{CC} CHARACTERISTICS (TYP.)



t_{pZL}, t_{pZH} - V_{CC} CHARACTERISTICS (TYP.)



$I_{CC(opr)}$ TEST CIRCUIT



* INPUT WAVEFORM IS THE SAME AS THAT IN CASE OF SWITCHING CHARACTERISTICS TEST.

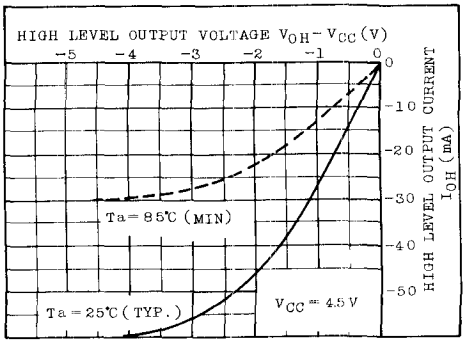
C_{PD} CALCULATION

C_{PD} is to be calculated with the for mula hereunder by using the measured value of $I_{CC(opr)}$ in the test circuit drawn left side.

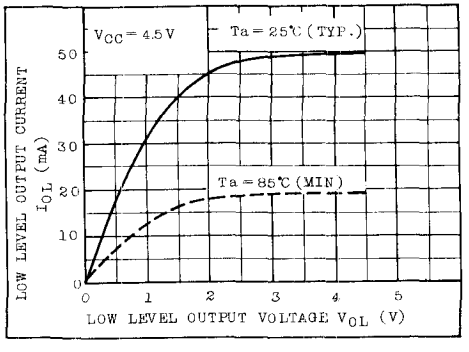
$$C_{PD} = \frac{I_{CC(opr)}}{f_{IN} \cdot V_{CC}}$$

At determining the typical value of C_{PD}, a relatively high frequency 1MHz was applied for f_{IN}, in order to eliminate the error from the quiescent supply current.

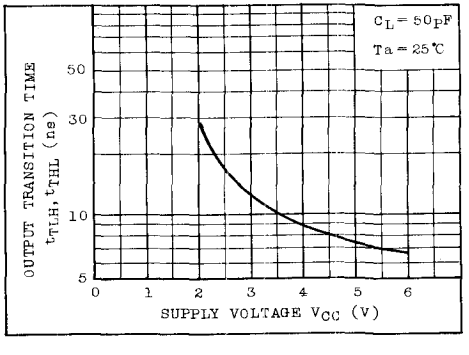
I_{OH} CHARACTERISTICS



I_{OL} CHARACTERISTICS



t_{TLH}, t_{THL} - V_{CC} CHARACTERISTICS (TYP.)



t_{PLH}, t_{PHL} - V_{CC} CHARACTERISTICS (TYP.)