TC74HC08P

TC74HC08P QUAD 2-INPUT AND GATE

The TC74HC08 is a high speed CMOS 2-INPUT AND GATE fabricated with silicon gate C^2MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

The internal circuit is composed of 2 stages including buffer output, which enables high noise immunity and stable output.
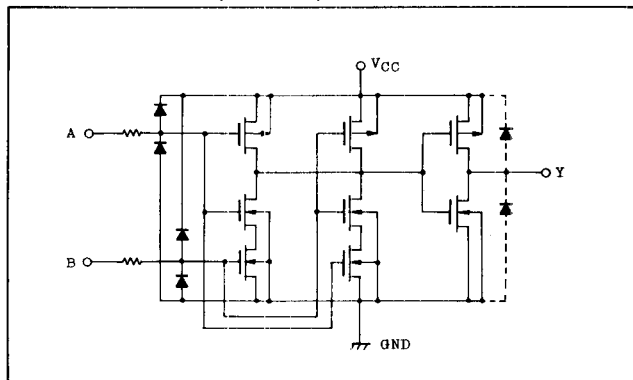
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

. High Speed....................t_{pd}=7ns(Typ.) at V_{CC}=5V
. Low Power Dissipation.........I_{CC}=1μA(Max.) at Ta=25°C
. High Noise Immunity..........V_{NIH}=V_{NIL}=28% V_{CC}(Min.)
. Output Drive Capability.......10 LSTTL Loads
. Symmetrical Output Impedance..|I_{OH}|=I_{OL}=4mA(Min.)
. Balanced Propagation Delays...t_{pLH}≑t_{pHL}
. Wide Operating Voltage Range..$V_{CC(opr)}$=2V～6V
. Pin and Function Compatible with 74LS08
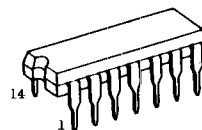
DIP(5-21F)

CIRCUIT SCHEMATIC (PER GATE)

PIN ASSIGNMENT

1A 1	14 V_{CC}
1B 2	13 4B
1Y 3	12 4A
2A 4	11 4Y
2B 5	10 3B
2Y 6	9 3A
GND 7	8 3Y

(TOP VIEW)
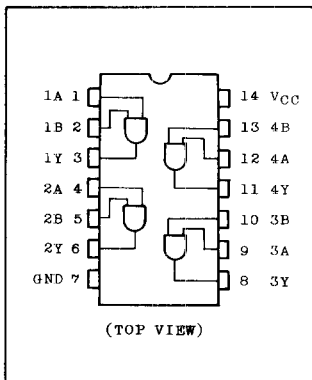
TC74HC08P

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}	±25	mA
DC V_{CC}/Ground Current	I_{CC}	±50	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°C~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	$0 \sim 500$	ns

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	
High-Level Output Voltage	V_{OH}	$V_{IN}=V_{IH}$							V
		$I_{OH}=-20\mu A$	2.0	1.9	2.0	–	1.9	–	
			4.5	4.4	4.5	–	4.4	–	
			6.0	5.9	6.0	–	5.9	–	
		$I_{OH}=-4mA$	4.5	4.18	4.31	–	4.13	–	
		$I_{OH}=-5.2mA$	6.0	5.68	5.80	–	5.63	–	

DC ELECTRICAL CHARACTERISTICS

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
Low-Level Output Voltage	V_{OL}	$V_{IN}=$ V_{IH} or V_{IL}	$I_{OL}=20\mu A$	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	
			$I_{OL}=4mA$	4.5	–	0.17	0.32	–	0.37	
			$I_{OL}=5.2mA$	6.0	–	0.18	0.32	–	0.37	
Input Leakage Current	I_{IN}	$V_{IN}=V_{CC}$ or GND		6.0	–	–	±0.1	–	±1.0	μA
Quiescent Supply Current	I_{CC}	$V_{IN}=V_{CC}$ or GND		6.0	–	–	1.0	–	10.0	

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} t_{THL}		2.0	–	30	75	–	90	ns
			4.5	–	8	15	–	18	
			6.0	–	7	13	–	16	
Propagation Delay Time	t_{pLH} t_{pHL}		2.0	–	38	90	–	110	ns
			4.5	–	10	18	–	22	
			6.0	–	9	16	–	19	
Input Capacitance	C_{IN}			–	5	10	–	10	pF
Power Dissipation Capacitance	$C_{PD}(1)$			–	21	–	–	–	

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).
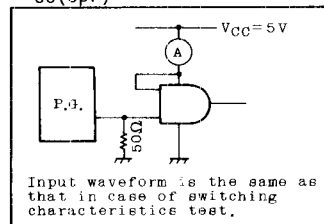Average operating current can be obtained by the equation hereunder.
$$I_{CC}(opr)=C_{PD}\cdot V_{CC}\cdot f_{IN}+I_{CC}/4 \text{ (per Gate)}$$
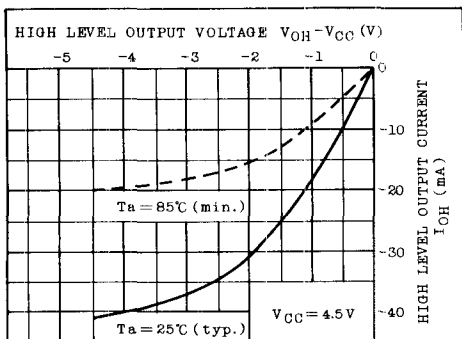
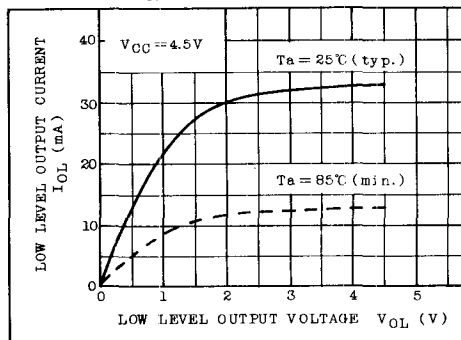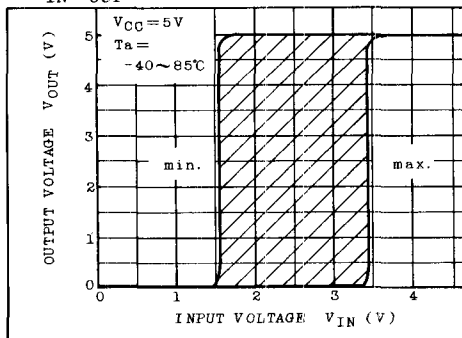## SWITCHING CHARACTERISTICS TEST CIRCUIT
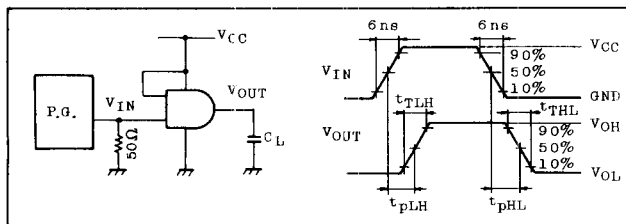
$I_{CC(opr)}$ TEST CIRCUIT

Input waveform is the same as that in case of switching characteristics test.

I_{OH} CHARACTERISTICS

HIGH LEVEL OUTPUT VOLTAGE V_{OH}-V_{CC} (V)

V_{CC} = 4.5 V
Ta = 25℃ (typ.)
Ta = 85℃ (min.)

I_{OL} CHARACTERISTICS

V_{CC} = 4.5 V
Ta = 25℃ (typ.)
Ta = 85℃ (min.)

LOW LEVEL OUTPUT VOLTAGE V_{OL} (V)

V_{IN}-V_{OUT} CHARACTERISTICS (MIN., MAX.)

V_{CC} = 5V
Ta =
−40 ~ 85℃
min.
max.

INPUT VOLTAGE V_{IN} (V)

V_{IN}-V_{OUT} CHARACTERISTICS (TYP.)

V_{CC} = 5 V
Ta = 25℃

INPUT VOLTAGE V_{IN} (V)
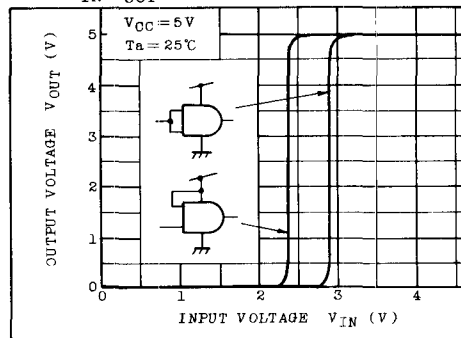
t_{TLH}, t_{THL}-V_{CC} CHARACTERISTICS (TYP.)

C_L = 50 pF
Ta = 25℃

SUPPLY VOLTAGE V_{CC} (V)
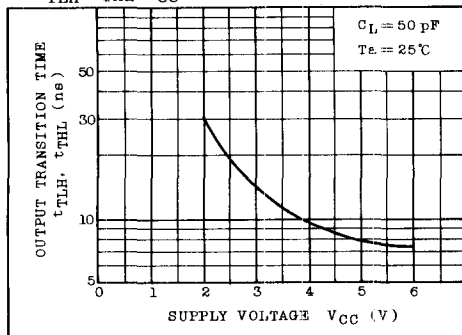
t_{pLH}, t_{pHL}-V_{CC} CHARACTERISTICS (TYP.)

C_L = 50 pF
Ta = 25℃
t_{pHL}
t_{pLH}

SUPPLY VOLTAGE V_{CC} (V)
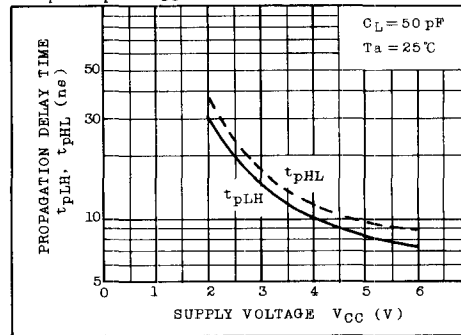
$t_{TLH}, t_{THL} - C_L$ CHARACTERISTICS (TYP.)

OUTPUT TRANSITION TIME t_{TLH}, t_{THL} (ns)

$V_{CC} = 5$ V
$Ta = 25$ ℃

LOAD CAPACITANCE C_L (pF)
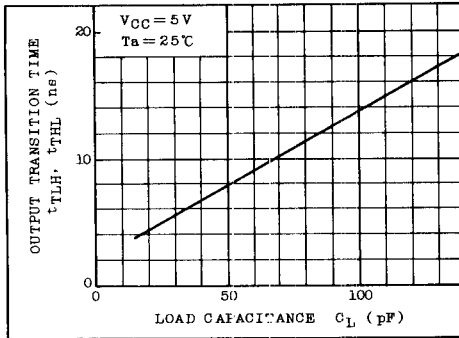
$t_{pLH}, t_{pHL} - C_L$ CHARACTERISTICS (TYP.)

PROPAGATION DELAY TIME t_{pLH}, t_{pHL} (ns)

$V_{CC} = 5$ V
$Ta = 25$ ℃

t_{pHL}

t_{pLH}

LOAD CAPACITANCE C_L (pF)

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