

TC74HC240P OCTAL BUS BUFFER WITH INVERTED 3-STATE OUTPUTS
TC74HC241P OCTAL BUS BUFFER WITH NONINVERTED 3-STATE OUTPUTS
TC74HC244P OCTAL BUS BUFFER WITH NONINVERTED 3-STATE OUTPUTS

The TC74HC240, TC74HC241 and TC74HC244 are high speed CMOS OCTAL BUS BUFFER's fabricated with silicon C²MOS technology.

They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

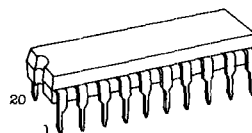
The designer has a choice of selected combinations of inverting and noninverting outputs, symmetrical $\bar{G}$ (active-low output control) inputs, and complementary G and $\bar{G}$ inputs. Each control input govern four BUS BUFFERs.

These devices are designated to be used with 3-state memory address drivers, etc.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

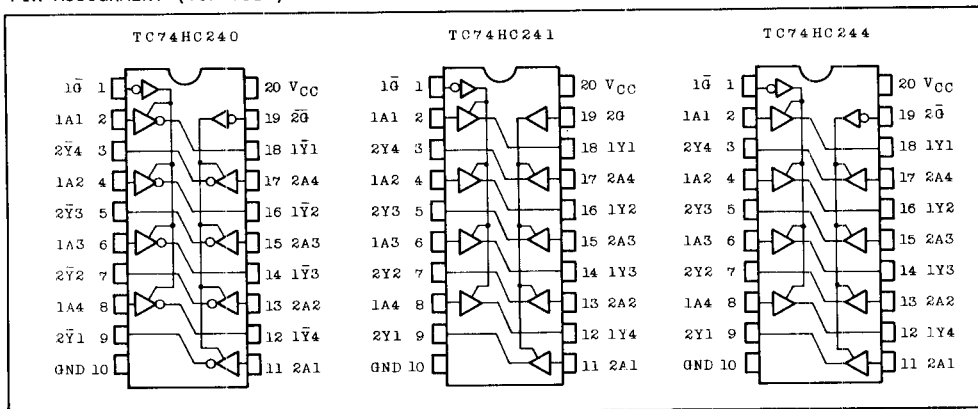
FEATURES:

- . High Speed..... $t_{pd}=12ns$ (Typ.) at $V_{CC}=5V$
- . Low Power Dissipation..... $I_{CC}=4\mu A$ (Max.) at $T_a=25^\circ C$
- . High Noise Immunity..... $V_{NIH}=V_{NIL}=28\% V_{CC}$ (Min.)
- . Output Drive Capability.....15 LSTTL Loads
- . Symmetrical Output Impedance... $|I_{OH}|=I_{OL}=6mA$ (Min.)
- . Balanced Propagation Delays... $t_{PLH}\div t_{PHL}$
- . Wide Operating Voltage Range.. $V_{CC(opr)}=2V\sim 6V$
- . Pin and Function Compatible with 74LS 240/241/244

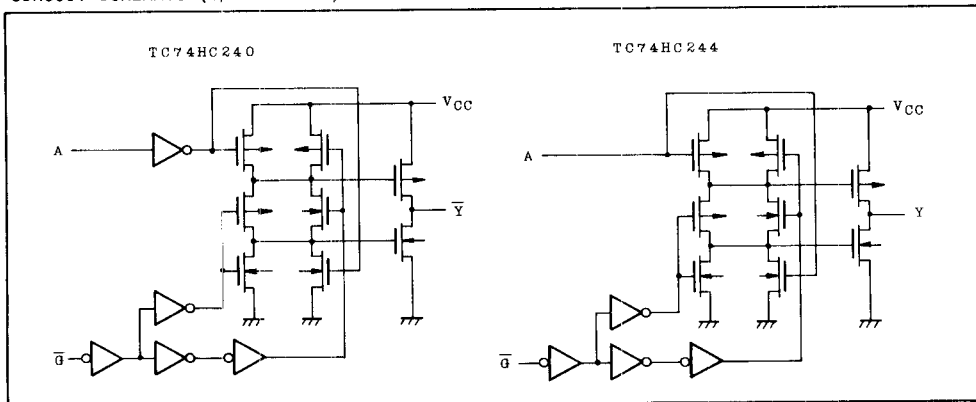


DIP (5-25A)

PIN ASSIGNMENT (TOP VIEW)



CIRCUIT SCHEMATIC (1/8 PACKAGE)



TRUTH TABLE

INPUTS			OUTPUTS	
$\bar{G}$	$G \triangle$	A_n	Y_n	$\bar{Y}_n \triangle\triangle$
L	H	L	L	H
L	H	H	H	L
H	L	*	Z	Z

$\triangle$: Applied only for TC74HC241

$\triangle\triangle$: Applied only for TC74HC240

* : D'ont Care

Z : High Impedance

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ABSOLUTE MAXIMUM RATINGS

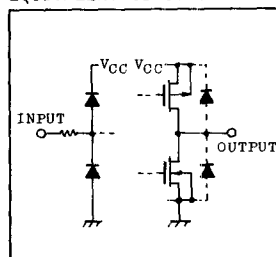
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V _{CC}	-0.5 ~ 7	V
DC Input Voltage	V _{IN}	-0.5 ~ V _{CC} +0.5	V
DC Output Voltage	V _{OUT}	-0.5 ~ V _{CC} +0.5	V
Input Diode Current	I _{IK}	±20	mA
Output Diode Current	I _{OK}	±20	mA
DC Output Current	I _{OUT}	±25	mA
DC V _{CC} /Ground Current	I _{CC}	±50	mA
Power Dissipation	P _D	500*	mW
Storage Temperature	T _{stg}	-65 ~ 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 ~ 6	V
Input Voltage	V _{IN}	0 ~ V _{CC}	V
Output Voltage	V _{OUT}	0 ~ V _{CC}	V
Operating Temperature	T _{opr}	-40 ~ 85	°C
Input Rise and Fall Time	t _r , t _f	0 ~ 500	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	
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	
		I _{OH} =-6mA I _{OH} =-7.8mA	6.0	5.9	6.0	-	5.9	-	
			4.5	4.18	4.31	-	4.13	-	
			6.0	5.68	5.80	-	5.63	-	

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	Ta=25°C				Ta=-40~85°C		UNIT
			VCC	MIN.	TYP.	MAX.	MIN.	MAX.	
Low-Level Output Voltage	VOL	VIN=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 I _{OL} =7.8mA	4.5	-	0.17	0.32	-	0.37	
			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	Ta=25°C				Ta=-40~85°C		UNIT
			VCC	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t _{TLH} t _{THL}		2.0	-	25	60	-	75	ns
			4.5	-	8	12	-	15	
			6.0	-	6	10	-	13	
Propagation Delay Time	t _{PLH} t _{PHL}		2.0	-	50	110	-	135	
			4.5	-	14	22	-	27	
			6.0	-	12	19	-	23	
Output Enable Time	t _{pZL} t _{pZH}	R _L =1kΩ	2.0	-	45	100	-	120	
			4.5	-	12	20	-	24	
			6.0	-	10	17	-	21	
Output Disable Time	t _{pLZ} t _{pHZ}	R _L =1kΩ	2.0	-	43	165	-	200	
			4.5	-	22	33	-	40	
			6.0	-	20	30	-	36	
Input Capacitance	C _{IN}			-	5	10	-	10	pF
Output Capacitance	C _{OUT}			-	10	-	-	-	
Power Dissipation Capacitance	C _{PD}	(Note 1)		-	40	-	-	-	

AC ELECTRICAL CHARACTERISTICS ($C_L=50\text{pF}$, Input $t_r=t_f=6\text{ns}$)

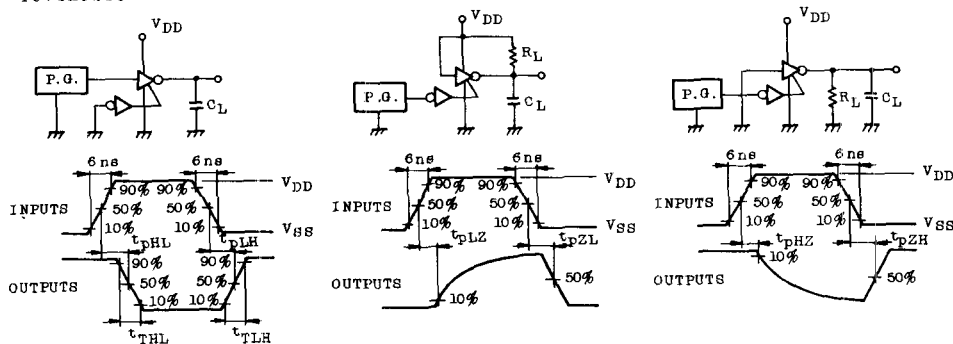
Note (1) C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit).

Average operating current can be obtained by the equation hereunder.

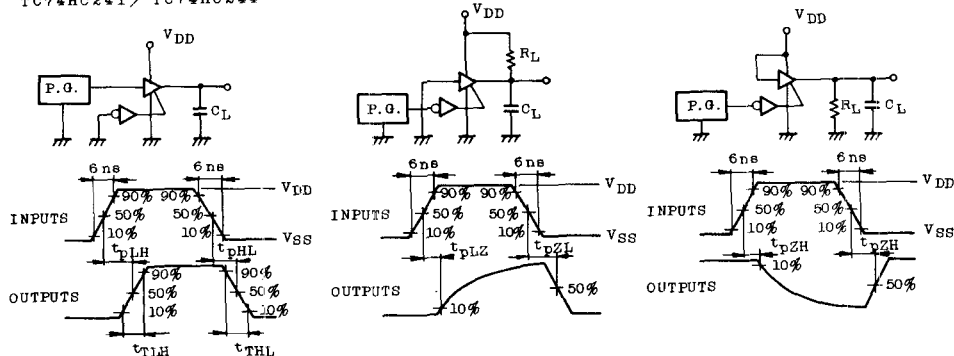
$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8 \text{ (per Gate)}$$

SWITCHING CHARACTERISTICS TEST CIRCUIT

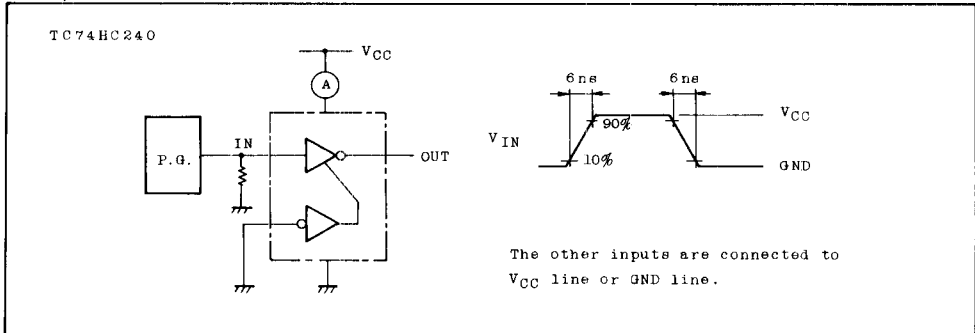
TC74HC240



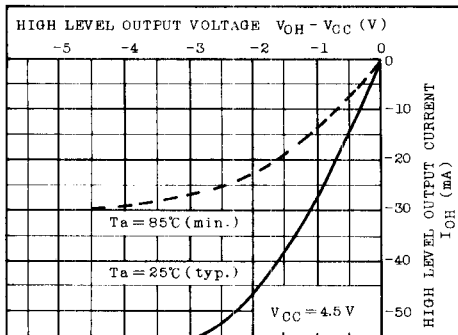
TC74HC241 / TC74HC244



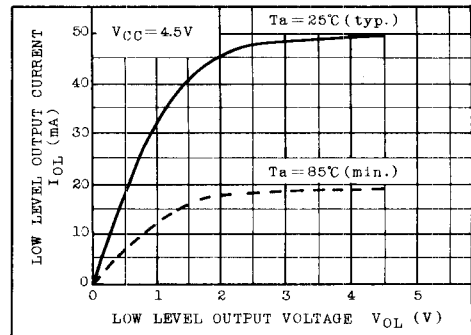
$I_{CC(opr)}$ TEST CIRCUIT



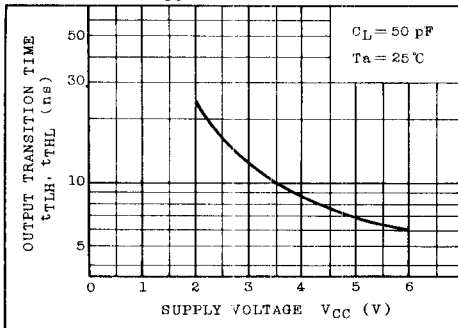
I_{OH} CHARACTERISTICS



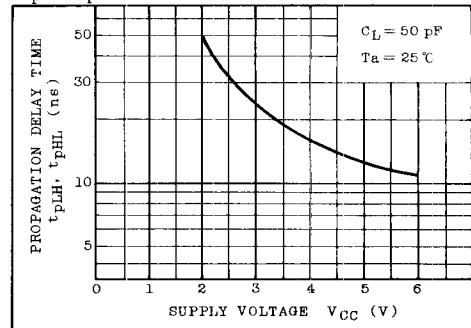
I_{OL} CHARACTERISTICS



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

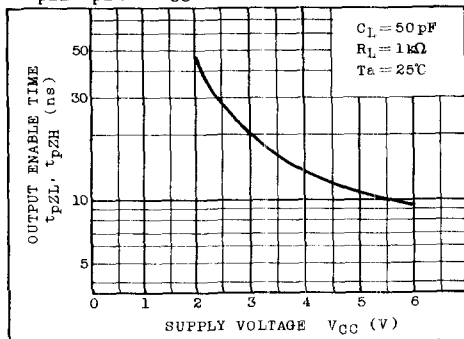


$t_{PLH}, t_{PHL} - V_{CC}$ CHARACTERISTICS (TYP.)

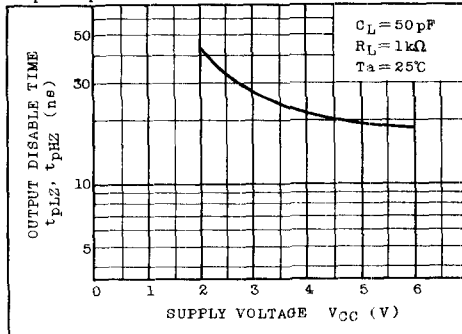


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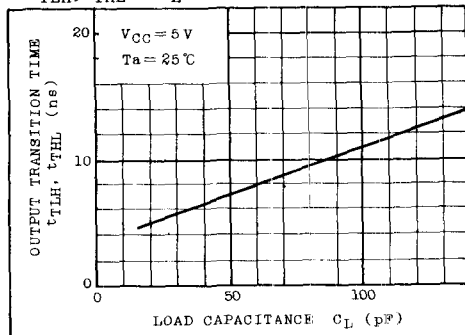
$t_{pZL}, t_{pZH} - V_{CC}$ CHARACTERISTICS (TYP.)



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



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



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

