

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74HC7240AP, TC74HC7240AF

TC74HC7244AP, TC74HC7244AF

OCTAL BUS BUFFER (WITH SCHMITT TRIGGER INPUTS)

TC74HC7240AP/AF INVERTED, 3-STATE OUTPUTS

TC74HC7244AP/AF NON-INVERTED, 3-STATE OUTPUTS

The TC74HC7240A/7244A are high speed CMOS OCTAL BUS BUFFERS with silicon gate C²MOS technology.

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

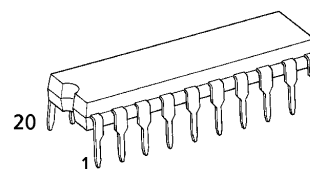
The TC74HC7240A/7244A have same pin configuration and function as the TC74HC240A/244A. And they have a hysteresis characteristics with each input, so TC74HC7240A/7244A can be used as a line receiver, etc.

They have two active low output enables.

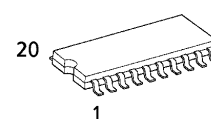
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

- High Speed..... $t_{pd} = 15\text{ns}(\text{typ.})$ at $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 4\mu\text{A}(\text{Max.})$ at $T_a = 25^\circ\text{C}$
- High Noise Immunity..... $V_H = 1.1\text{V}(\text{typ.})$ at $V_{CC} = 5\text{V}$
- Output Drive Capability..... 15 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = |I_{OL}| = 6\text{mA}(\text{Min.})$
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range..... $V_{CC}(\text{opr.}) = 2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 74LS240/244



P (DIP20-P-300-2.54A)
Weight : 1.30g (Typ.)



F (SOP20-P-300-1.27)
Weight : 0.22g (Typ.)

TRUTH TABLE

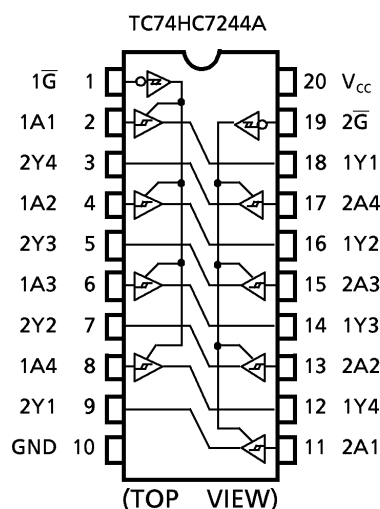
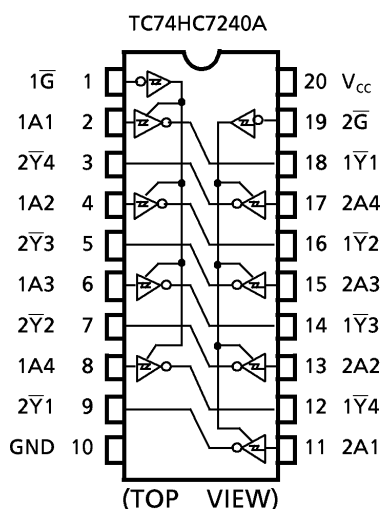
INPUTS		OUTPUTS	
$\overline{G}$	A_n	Y_n	$\overline{Y}_n^{\Delta}$
L	L	L	H
L	H	H	L
H	X	Z	Z

Δ : for TC74HC7240A only

X : Don't Care

Z : High Impedance

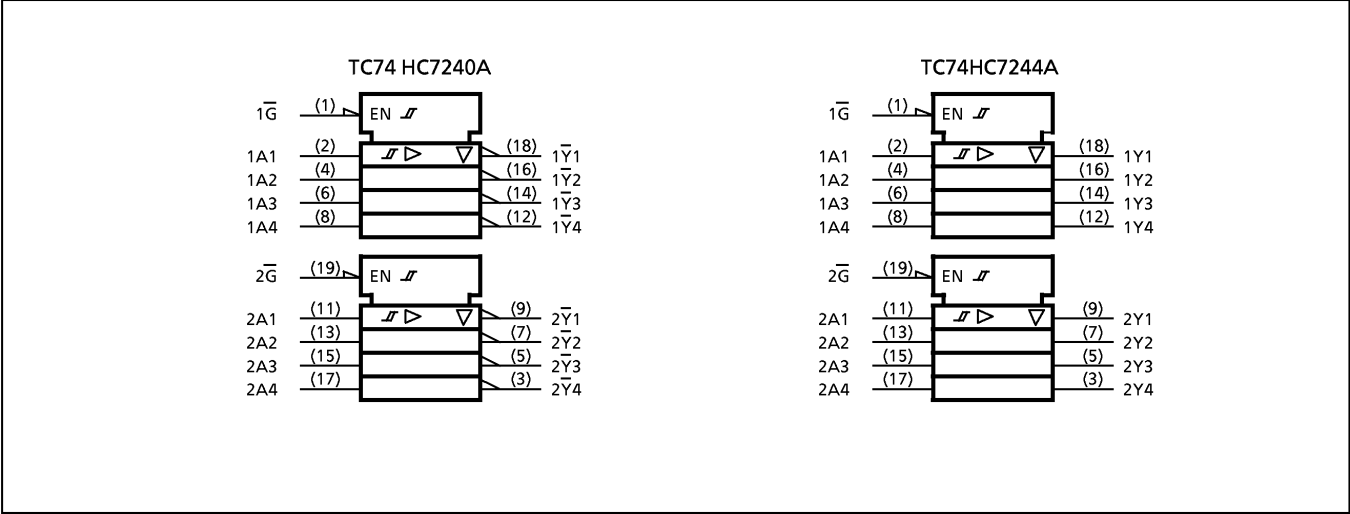
PIN ASSIGNMENT



980508EBA2

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IEC LOGIC SYMBOL



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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}	± 75	mA
Power Dissipation	P_D	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	°C

*500mW in the range of $T_a = -40^\circ\text{C} \sim 65^\circ\text{C}$. From $T_a = 65^\circ\text{C}$ to 85°C a derating factor of $-10\text{mW}/^\circ\text{C}$ shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	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

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40 \sim 85^\circ\text{C}$		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
Positive Threshold Voltage	V_P		2.0 4.5 6.0	1.0 2.3 3.0	1.25 2.7 3.5	1.5 3.15 4.2	1.0 2.3 3.0	1.5 3.15 4.2	V
Negative Threshold Voltage	V_N		2.0 4.5 6.0	0.3 1.13 1.5	0.65 1.6 2.3	0.9 2.0 2.6	0.3 1.13 1.5	0.9 2.0 2.6	V
Hysteresis Voltage	V_H		2.0 4.5 6.0	0.3 0.6 0.8	0.6 1.1 1.2	1.0 1.4 1.7	0.3 0.6 0.8	1.0 1.4 1.7	V
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -20\mu\text{A}$	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0	— — —	1.9 4.4 5.9	V
			$I_{OH} = -6\text{ mA}$ $I_{OH} = -7.8\text{ mA}$	4.5 6.0	4.18 5.68	4.31 5.80	— —	4.13 5.63	
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 20\mu\text{A}$	2.0 4.5 6.0	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	V
			$I_{OL} = 6\text{ mA}$ $I_{OL} = 7.8\text{ mA}$	4.5 6.0	— —	0.17 0.18	0.26 0.26	— —	
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 (Input $t_r = t_f = 6\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	CL (PF)	V _{CC} (V)	Ta = 25°C			Ta = −40~85°C		UNIT	
					MIN.	TYP.	MAX.	MIN.	MAX.		
Output Transition Time	t _{TLH} t _{THL}		50	2.0	—	25	60	—	75	ns	
				4.5	—	7	12	—	15		
				6.0	—	6	10	—	13		
Propagation Delay Time	t _{pLH}		50	2.0	—	50	125	—	155		
				4.5	—	15	25	—	31		
				6.0	—	13	21	—	26		
	t _{pHL}		150	2.0	—	67	165	—	205		
				4.5	—	20	33	—	41		
				6.0	—	17	28	—	35		
Output Enable Time	t _{pZL}	R _L = 1kΩ	50	2.0	—	68	150	—	190		
				4.5	—	21	30	—	38		
				6.0	—	16	26	—	32		
	t _{pZH}			150	2.0	—	84	165	—		230
					4.5	—	26	37	—		46
					6.0	—	20	31	—		39
Output Disable Time	t _{pLZ} t _{pHZ}	R _L = 1kΩ	50	2.0	—	48	150	—	190		
				4.5	—	21	30	—	38		
				6.0	—	19	26	—	32		
Input Capacitance	C _{IN}				—	5	10	—	10	pF	
Output Capacitance	C _{OUT}				—	10	—	—	—		
Power Dissipation Capacitance	C _{PD} (1)	TC74HC7240A			—	33	—	—	—		
		TC74HC 7244A				34	—	—	—		

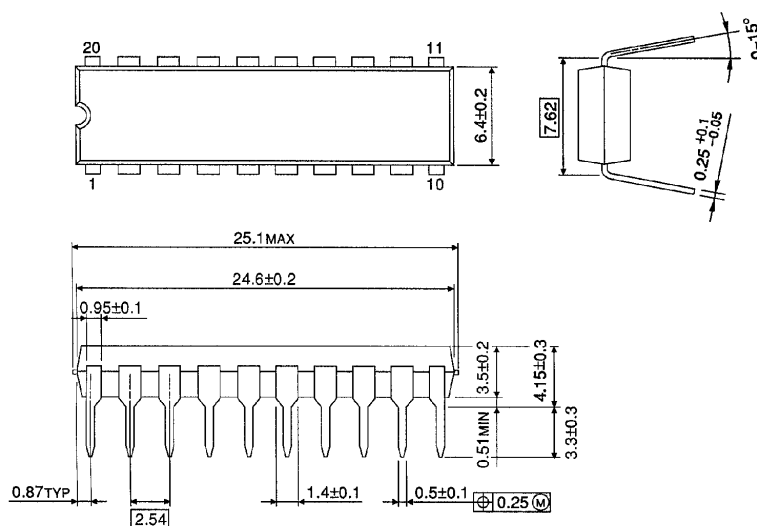
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

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

DIP 20PIN OUTLINE DRAWING (DIP20-P-300-2.54A)

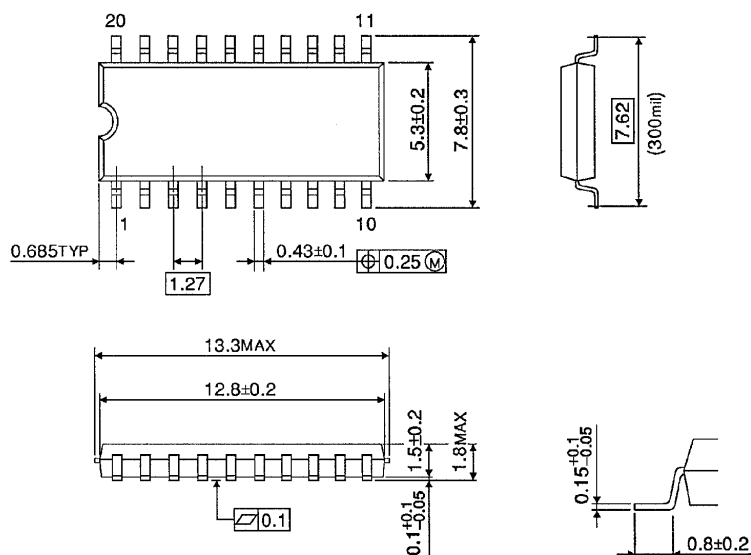
Unit in mm



Weight : 1.30g (Typ.)

SOP 20PIN (200mil BODY) OUTLINE DRAWING (SOP20-P-300-1.27)

Unit in mm



Weight : 0.22g (Typ.)