

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

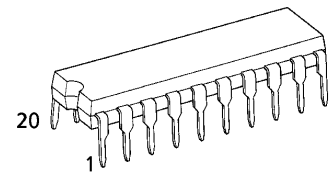
TC74HC7240AP, TC74HC7240AF
TC74HC7244AP, TC74HC7244AF

OCTAL BUS BUFFER (WITH SCHMITT TRIGGER INPUTS)
TC74HC7240AP/AF INVERTED, 3 – STATE OUTPUTS
TC74HC7244AP/AF NON – INVERTED, 3 – STATE OUTPUTS

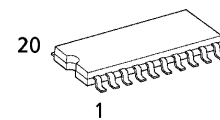
The TC74HC7240A/7244A are high speed CMOS OCTAL BUS BUFFERs with silicon gate C²MOS technology. They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. The TC74HC7240A/7244A have same pin configuration and function as the TC74HC240A/244A. And 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.)



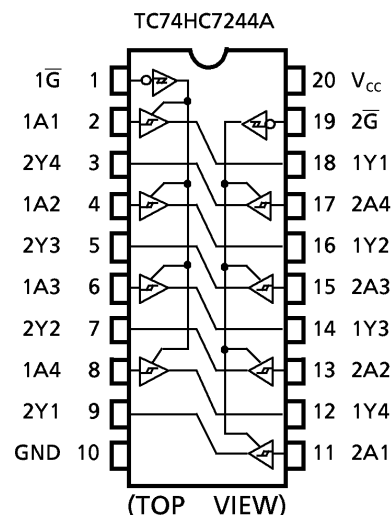
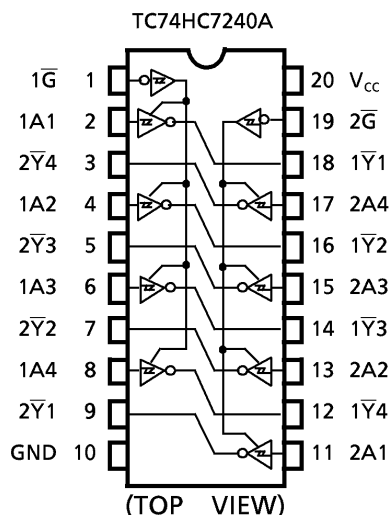
F (SOP20-P-300-1.27)
 Weight : 0.22g (Typ.)

TRUTH TABLE

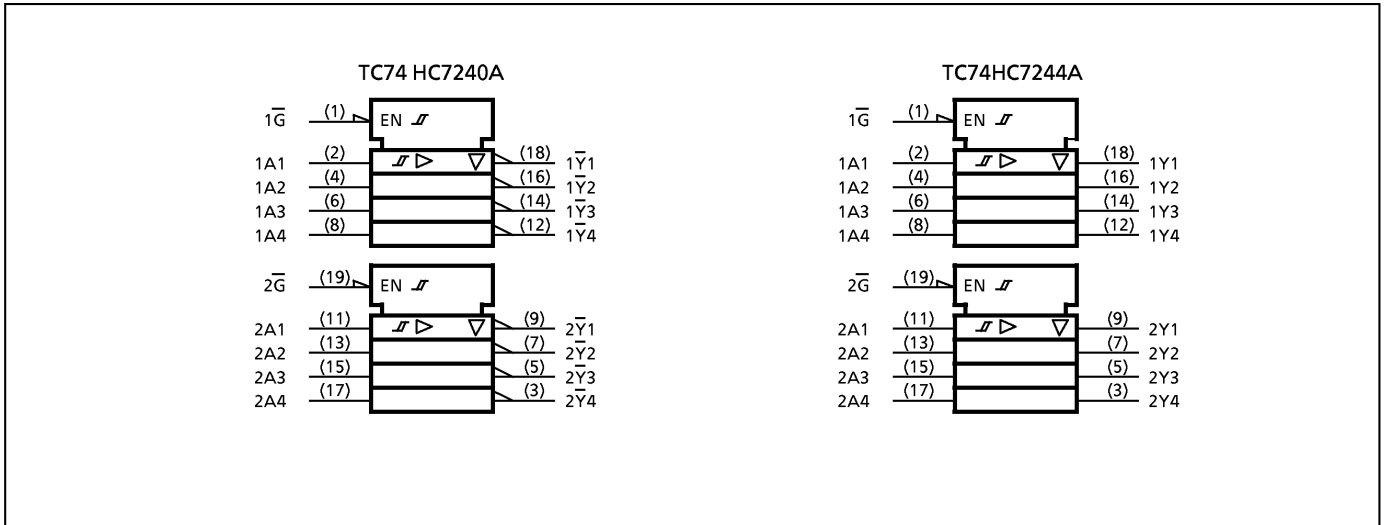
INPUTS		OUTPUTS	
\bar{G}	A_n	Y_n	\bar{Y}_n^{Δ}
L	L	L	H
L	H	H	L
H	X	Z	Z

Δ : for TC74HC7240A only
 X : Don't Care
 Z : High Impedance

PIN ASSIGNMENT



IEC LOGIC SYMBOL



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}	± 35	mA
DC V_{CC} /Ground Current	I_{CC}	± 75	mA
Power Dissipation	P_D	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	T_{stg}	-65~150	°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}	2~6	V
Input Voltage	V_{IN}	0~ V_{CC}	V
Output Voltage	V_{OUT}	0~ V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C

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	1.0	1.25	1.5	1.0	1.5	V	
			4.5	2.3	2.7	3.15	2.3	3.15		
			6.0	3.0	3.5	4.2	3.0	4.2		
Negative Threshold Voltage	V_N		2.0	0.3	0.65	0.9	0.3	0.9	V	
			4.5	1.13	1.6	2.0	1.13	2.0		
			6.0	1.5	2.3	2.6	1.5	2.6		
Hysteresis Voltage	V_H		2.0	0.3	0.6	1.0	0.3	1.0	V	
			4.5	0.6	1.1	1.4	0.6	1.4		
			6.0	0.8	1.2	1.7	0.8	1.7		
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -20\mu\text{A}$	2.0	1.9	2.0	—	1.9	V	
				4.5	4.4	4.5	—	4.4		
			$I_{OH} = -6\text{ mA}$ $I_{OH} = -7.8\text{mA}$	6.0	5.9	6.0	—	5.9		
				4.5	4.18	4.31	—	4.13		
			$I_{OH} = -7.8\text{mA}$	6.0	5.68	5.80	—	5.63		
				6.0	5.68	5.80	—	5.63		
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 20\mu\text{A}$	2.0	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
			$I_{OL} = 6\text{ mA}$ $I_{OL} = 7.8\text{mA}$	6.0	—	0.0	0.1	—	0.1	
				4.5	—	0.17	0.26	—	0.33	
			$I_{OL} = 7.8\text{mA}$	6.0	—	0.18	0.26	—	0.33	
				6.0	—	0.18	0.26	—	0.33	
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			Ta = 25°C			Ta = -40-85°C		UNIT
			CL (PF)	V _{CC} (V)	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}	$R_L = 1\text{k}\Omega$	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}	$R_L = 1\text{k}\Omega$	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	—	—	—	

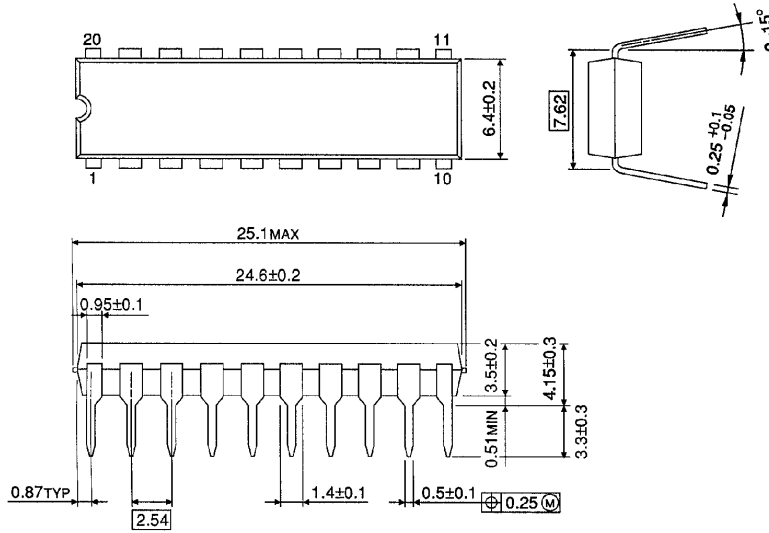
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

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 PACKAGE DIMENSIONS (DIP20-P-300-2.54A)

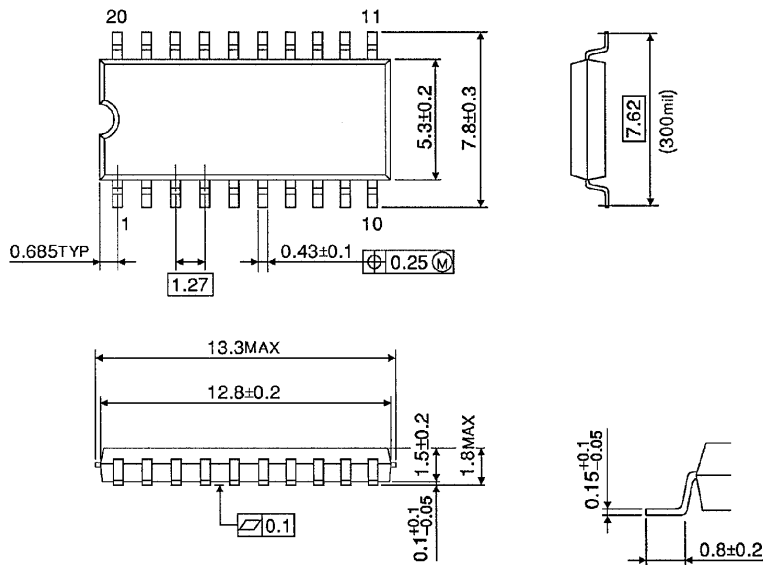
Unit in mm



Weight : 1.30g (Typ.)

SOP 20PIN (200mil BODY) PACKAGE DIMENSIONS (SOP20-P-300-1.27)

Unit in mm



Weight : 0.22g (Typ.)

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