

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TC74HCT240AP, TC74HCT240AF, TC74HCT240AFW**  
**TC74HCT244AP, TC74HCT244AF, TC74HCT244AFW**

**OCTAL BUS BUFFER WITH TTL INPUT LEVEL**  
**TC74HCT240AP/AF/AFW INVERTED, 3 – STATE OUTPUTS**  
**TC74HCT244AP/AF/AFW NON – INVERTED, 3 – STATE OUTPUTS**

(Note) The JEDEC SOP (FW) is not available in Japan.

The TC74HCT240A, and HCT244A are high speed CMOS OCTAL BUS BUFFERS fabricated with silicon gate C<sup>2</sup>MOS technology.

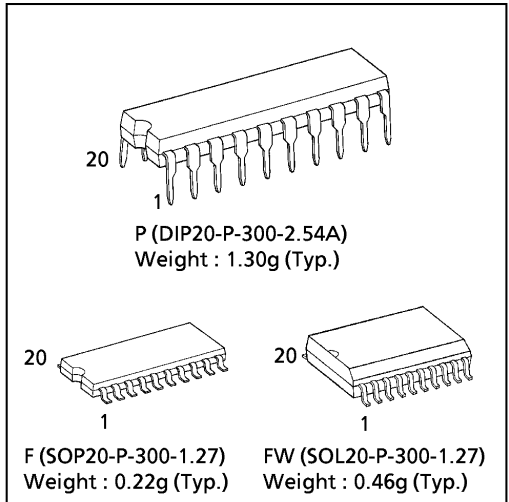
They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. Their inputs are compatible with TTL, NMOS, and CMOS output voltage levels. The TC74HCT240A is an inverting 3-state buffer having two active - low output enables. The TC74HCT244A is non-inverting 3-state buffer the HCT244A has two active - low output enables.

These devices are designed 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..... $t_{pd} = 13ns(typ.)$  at  $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 4\mu A(Max.)$  at  $T_a = 25^\circ C$
- Compatible with TTL outputs.... $V_{IL} = 0.8V(Max.)$   
 $V_{IH} = 2.0V(Min.)$
- Wide Interfacing ability.....LSTTL, NMOS, CMOS
- Output Drive Capability.....15 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = I_{OL} = 6mA(Min.)$
- Balanced Propagation Delays.... $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range... $V_{CC} (opr.) = 2V \sim 6V$
- Pin and Function Compatible with 74LS 240 / 244

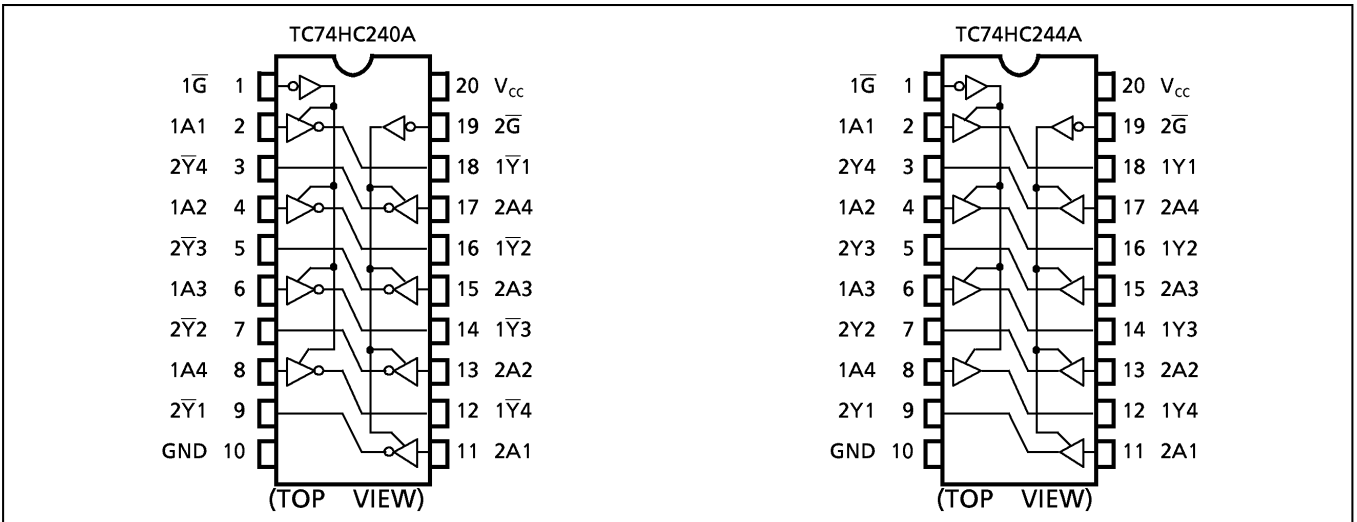


**TRUTH TABLE**

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

$\Delta\Delta$  : for TC74HCT240A only  
X : Don't Care  
Z : High Impedance

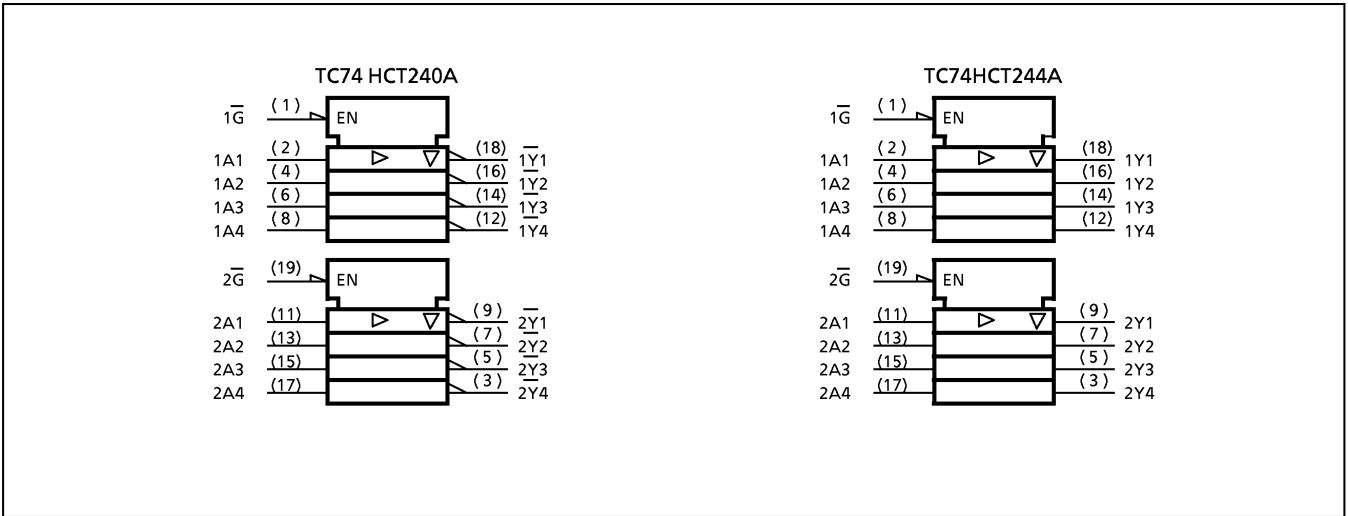
**PIN ASSIGNMENT**



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IEC LOGIC SYMBOL



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## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	$V_{CC}$	-0.5~7	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  $85^{\circ}\text{C}$  a derating factor of  $-10\text{mW}/^{\circ}\text{C}$  shall be applied until 300mW.

## RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{CC}$	4.5~5.5	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

## 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.		
High - Level Input Voltage	$V_{IH}$		4.5 ┆ 5.5	2.0	—	—	2.0	—	V	
Low - Level Input Voltage	$V_{IL}$		4.5 ┆ 5.5	—	—	0.8	—	0.8	V	
High - Level Output Voltage	$V_{OH}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OH} = -20 \mu\text{A}$	4.5	4.4	4.5	—	4.4	—	V
			$I_{OH} = -6 \text{ mA}$	4.5	4.18	4.31	—	4.13	—	
Low - Level Output Voltage	$V_{OL}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OL} = 20 \mu\text{A}$	4.5	—	0.0	0.1	—	0.1	V
			$I_{OL} = 6 \text{ mA}$	4.5	—	0.17	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	5.5	—	—	±0.5	—	±5.0	$\mu\text{A}$	
Input Leakage Current	$I_{IN}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	±0.1	—	±1.0		
Quiescent Supply Current	$I_{CC}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	4.0	—	40.0		
	$I_C$	Per input: $V_{IN} = 0.5\text{V}$ or $2.4\text{V}$ Other input: $V_{CC}$ or GND	5.5	—	—	2.0	—	2.9	mA	

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

PARAMETER	SYMBOL	TEST CONDITION	CL (pF)	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	$t_{TLH}$ $t_{THL}$		50	4.5	—	7	12	—	15	ns
				5.5	—	6	11	—	14	
Propagation Delay Time *	$t_{pLH}$		50	4.5	—	15	22	—	28	
				5.5	—	13	20	—	25	
	$t_{pHL}$		150	4.5	—	21	30	—	38	
				5.5	—	16	27	—	34	
Propagation Delay Time **	$t_{pLH}$		50	4.5	—	15	25	—	31	
				5.5	—	13	22	—	28	
	$t_{pHL}$		150	4.5	—	21	33	—	41	
				5.5	—	18	29	—	37	
3-State Output Enable time	$t_{pZL}$	$R_L = 1\text{k}\Omega$	50	4.5	—	17	30	—	38	
				5.5	—	14	27	—	34	
	$t_{pZH}$		150	4.5	—	23	38	—	48	
				5.5	—	20	34	—	43	
3-State Output Disable time	$t_{pLZ}$ $t_{pHZ}$	$R_L = 1\text{k}\Omega$	50	4.5	—	16	30	—	38	
				5.5	—	13	27	—	34	
Input Capacitance	$C_{IN}$				—	5	10	—	10	pF
Output Capacitance	$C_{OUT}$				—	10	—	—	—	
Power Dissipation Capacitance (Note 1)	$C_{PD}$	*			—	33	—	—	—	
		**			—	31	—	—	—	

Note1:  $C_{PD}$  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 :

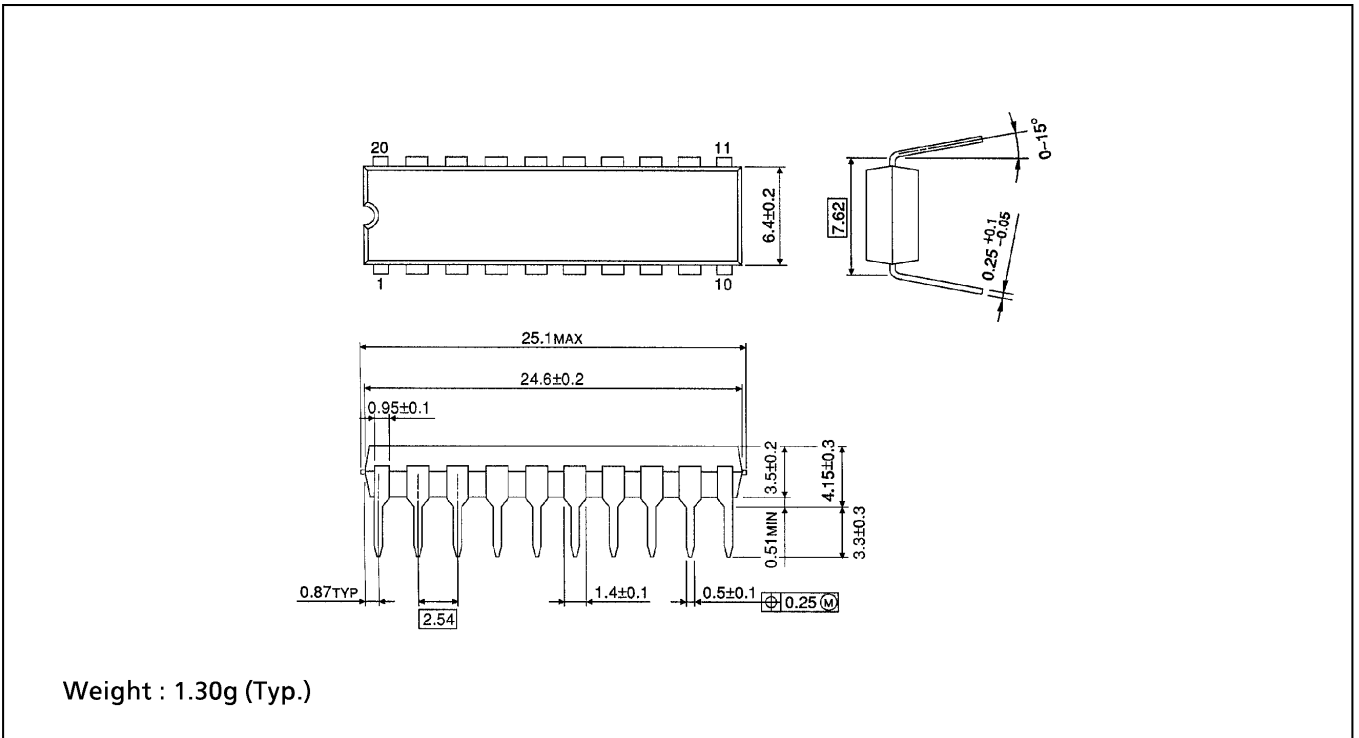
$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 8 \text{ (per bit)}$$

Note2: \* = TC74HCT240A

\*\* = TC74HCT244A

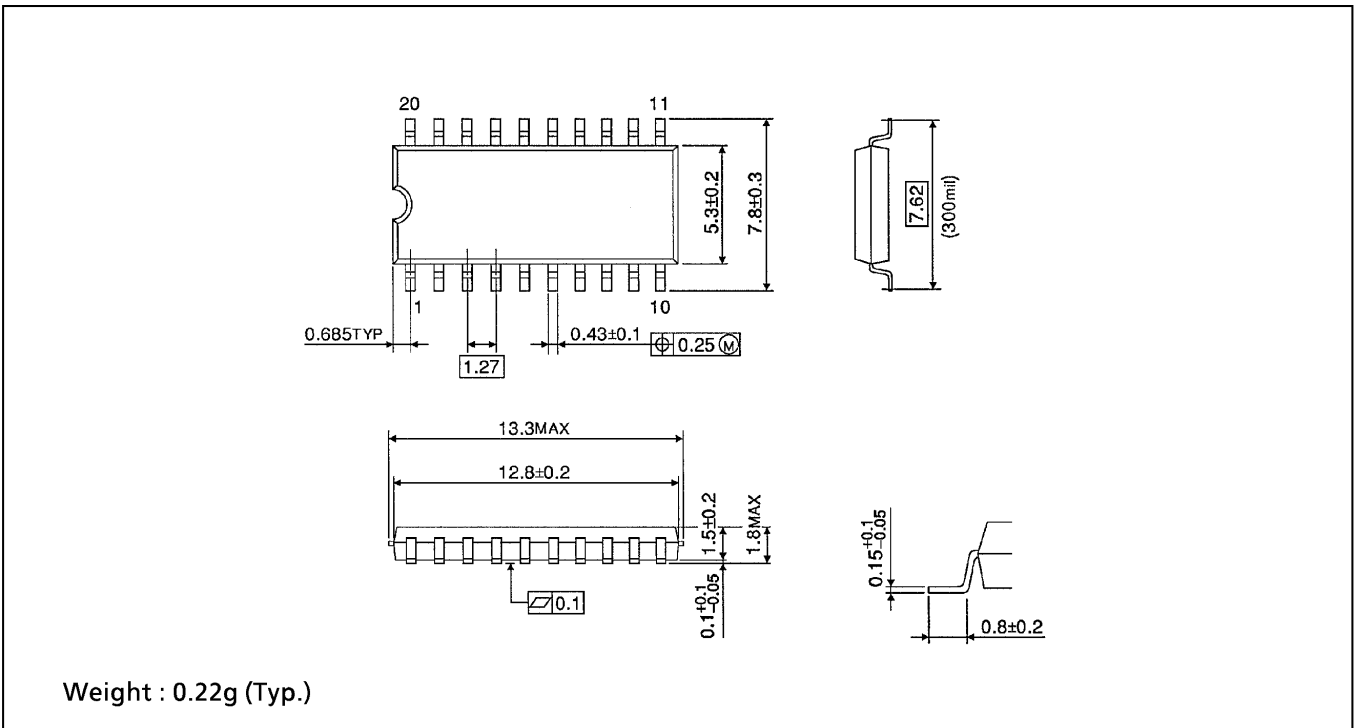
**DIP 20PIN OUTLINE DRAWING (DIP20-P-300-2.54A)**

Unit in mm



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

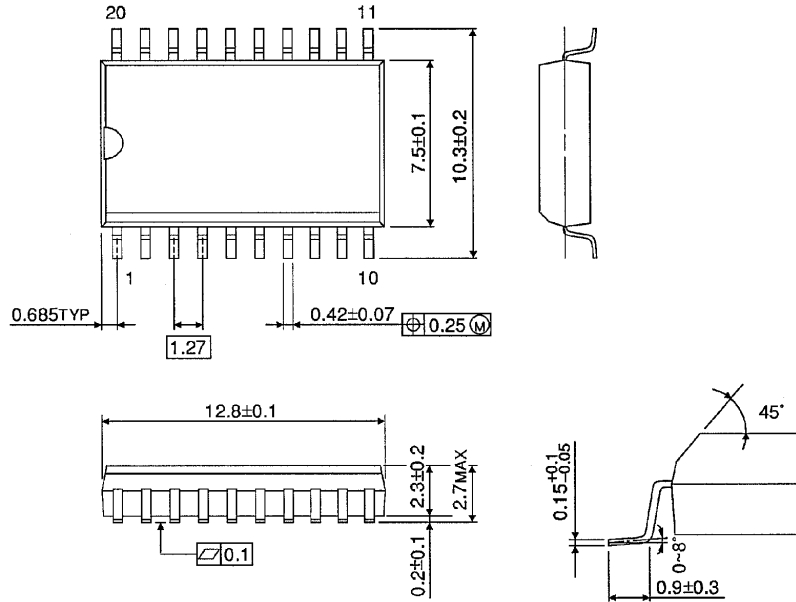
Unit in mm



**SOP 20PIN (300mil BODY) OUTLINE DRAWING (SOL20-P-300-1.27)**

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)