

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 CMOS technology.

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

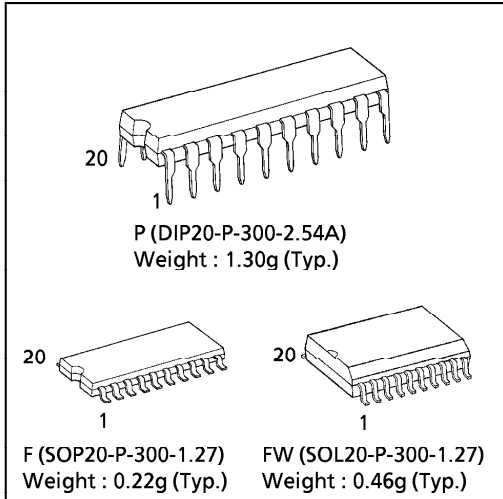
Their inputs are compatible with TTL, NMOS, and CMOS output voltage levels. The TC74HCT240A is an inverting 3-state buffer having two active-low output enables. The TC74HCT244A is non-inverting 3-state buffer the HCT244A has two active-low output enables.

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..... $t_{pd} = 13\text{ns}(\text{typ.})$ at $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 4\mu\text{A}(\text{Max.})$ at $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs.... $V_{IL} = 0.8\text{V}(\text{Max.})$
 $V_{IH} = 2.0\text{V}(\text{Min.})$
- Wide Interfacing ability.....LSTTL, NMOS, CMOS
- 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 74LS 240 / 244



TRUTH TABLE

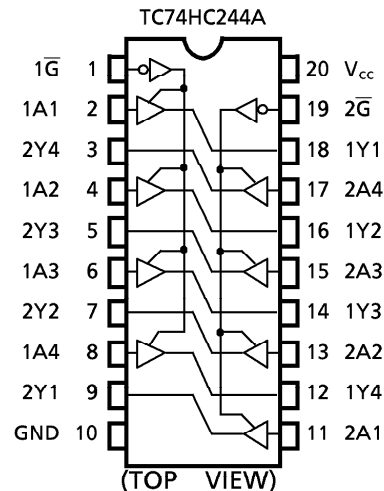
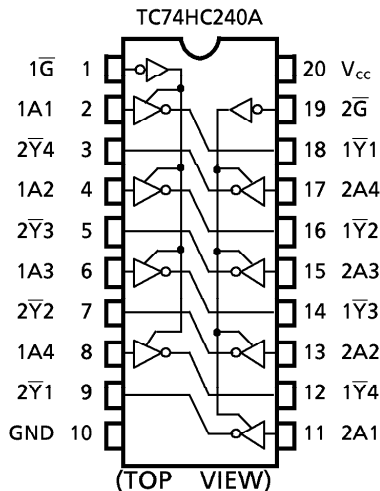
INPUTS		OUTPUTS	
$\bar{G}$	A_n	Y_n	$\bar{Y}_n^{\Delta\Delta}$
L	L	L	H
L	H	H	L
H	X	Z	Z

$\Delta\Delta$: for TC74HCT240A only

X : Don't Care

Z : High Impedance

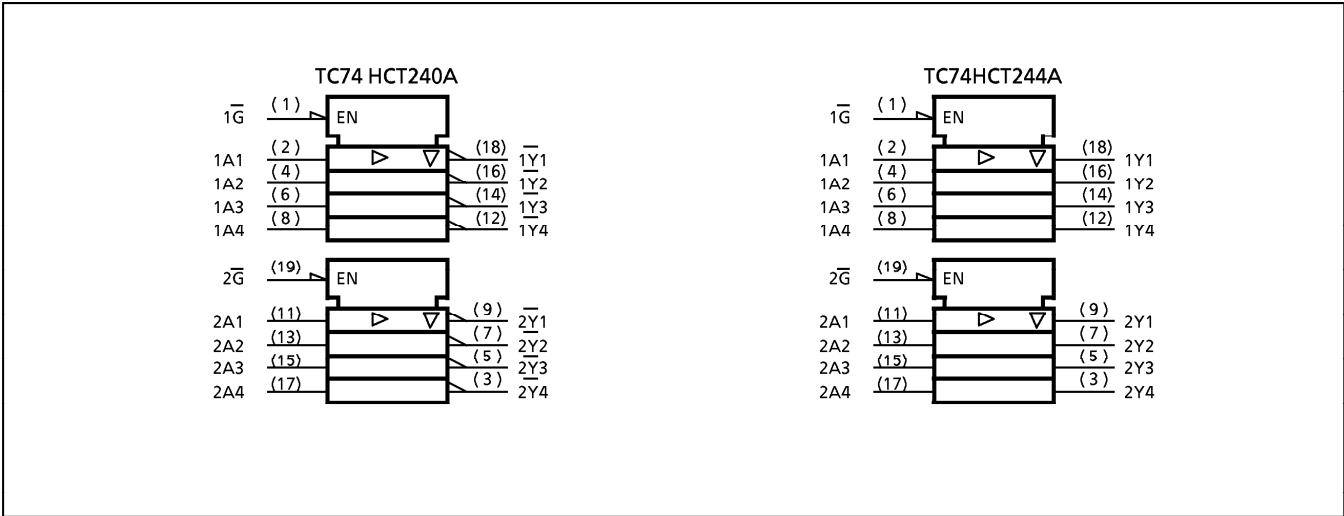
PIN ASSIGNMENT



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IEC LOGIC SYMBOL



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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7$	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}	$4.5 \sim 5.5$	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	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}		$4.5 \leq 5.5$	2.0	—	—	2.0	—	V
Low - Level Input Voltage	V_{IL}		$4.5 \leq 5.5$	—	—	0.8	—	0.8	V
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20 \mu\text{A}$	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}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20 \mu\text{A}$	4.5	—	0.0	0.1	—	V
			$I_{OL} = 6 \text{ mA}$	4.5	—	0.17	0.26	—	
3 - State Output Off - State Current	I_{OZ}	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $V_{OUT} = V_{CC} \text{ or GND}$	5.5	—	—	± 0.5	—	± 5.0	
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC} \text{ or GND}$	5.5	—	—	± 0.1	—	± 1.0	μA
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC} \text{ or GND}$	5.5	—	—	4.0	—	40.0	
	I_C	Per input: $V_{IN} = 0.5\text{V or } 2.4\text{V}$ Other input: $V_{CC} \text{ or GND}$	5.5	—	—	2.0	—	2.9	mA

AC ELECTRICAL CHARACTERISTICS ($C_L = 50\text{pF}$, 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	4.5 5.5	— —	7 6	12 11	— —	15 14	ns
Propagation Delay Time *	t_{PLH} t_{PHL}		50	4.5 5.5	— —	15 13	22 20	— —	28 25	
			150	4.5 5.5	— —	21 16	30 27	— —	38 34	
Propagation Delay Time **	t_{PLH} t_{PHL}		50	4.5 5.5	— —	15 13	25 22	— —	31 28	
			150	4.5 5.5	— —	21 18	33 29	— —	41 37	
3-State Output Enable time	t_{pZL} t_{pZH}	$R_L = 1\text{k}\Omega$	50	4.5 5.5	— —	17 14	30 27	— —	38 34	
			150	4.5 5.5	— —	23 20	38 34	— —	48 43	
3-State Output Disable time	t_{pLZ} t_{pHZ}	$R_L = 1\text{k}\Omega$	50	4.5 5.5	— —	16 13	30 27	— —	38 34	pF
Input Capacitance	C_{IN}				—	5	10	—	10	
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.

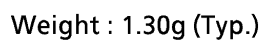
Average operating current can be obtained by the equation :

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

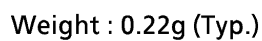
Note2: * = TC74HCT240A

** = TC74HCT244A

Unit in mm



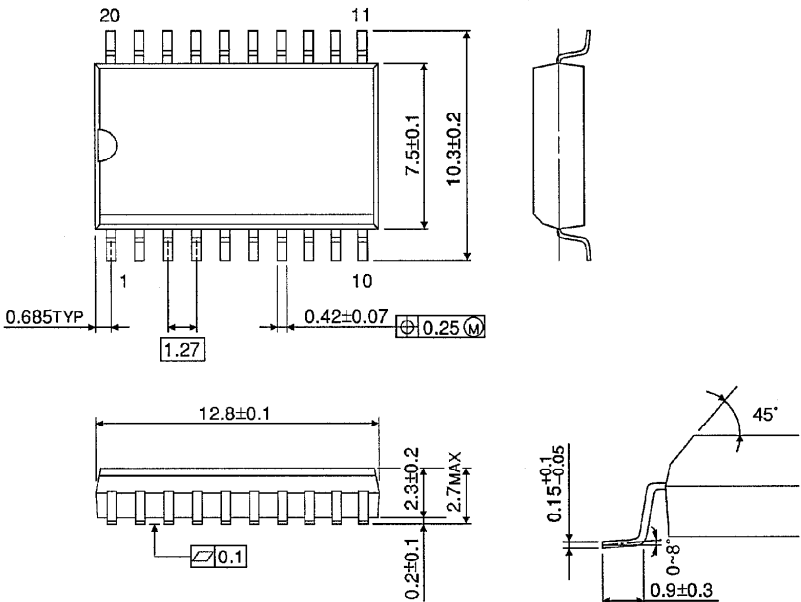
Unit in mm



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.)