

**TC74AC240P, TC74AC240F, TC74AC240FT
TC74AC244P, TC74AC244F, TC74AC244FT****Octal Bus Buffer**

TC74AC240P/F/FT	Inverted, 3-State Outputs
TC74AC244P/F/FT	Non-Inverted, 3-State Outputs

The TC74AC240 and 244 are advanced high speed CMOS OCTAL BUS BUFFERs fabricated with silicon gate and double-layer metal wiring C²MOS technology.

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

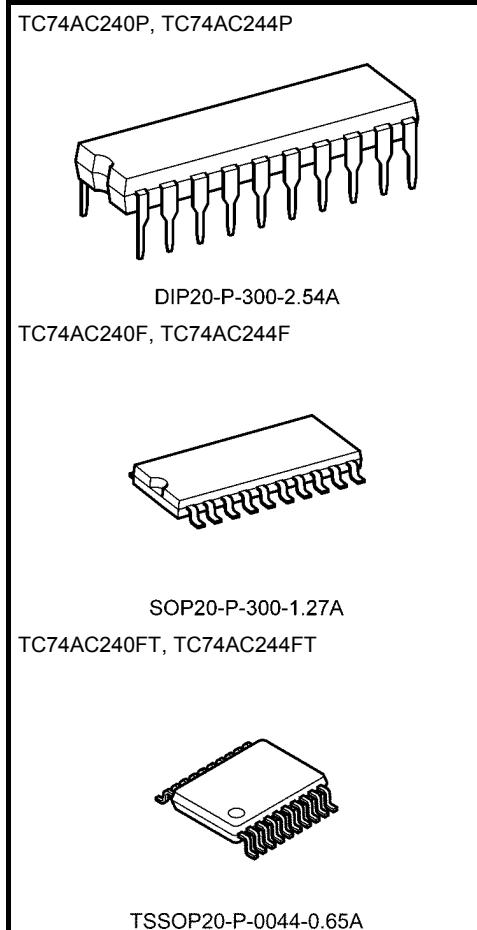
The 74AC240 is an inverting 3-state buffer while the 74AC244 is non-inverting. Both devices have two active-low output enables.

These devices are designed to be used in such applications as 3-state memory address drivers.

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

Features

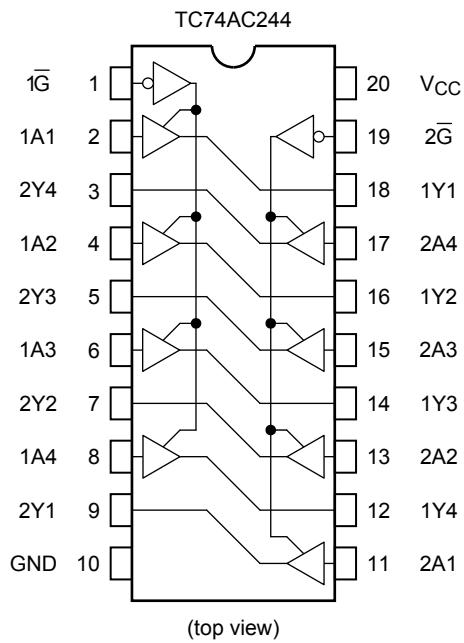
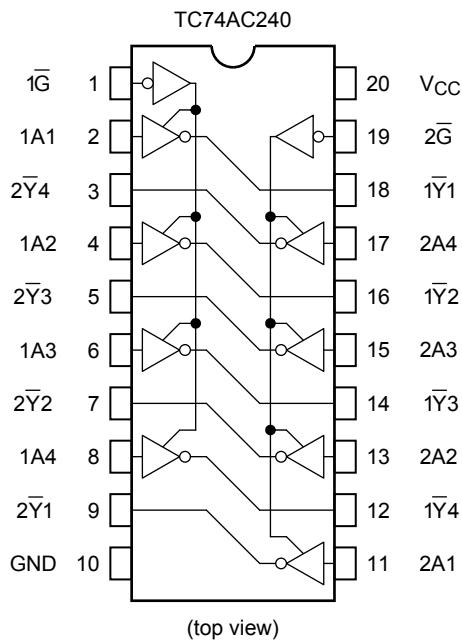
- High speed: $t_{pd} = 4.0$ ns (typ.) at $V_{CC} = 5$ V
- Low power dissipation: $I_{CC} = 8 \mu A$ (max) at $T_a = 25^\circ C$
- High noise immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min)
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 24$ mA (min)
Capability of driving 50 Ω transmission lines.
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Wide operating voltage range: V_{CC} (opr) = 2 to 5.5 V
- Pin and function compatible with 74F240/244

**Weight**

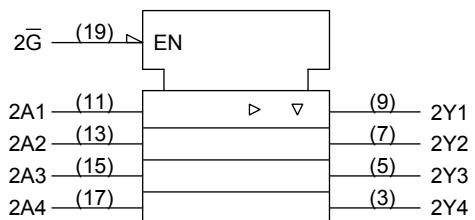
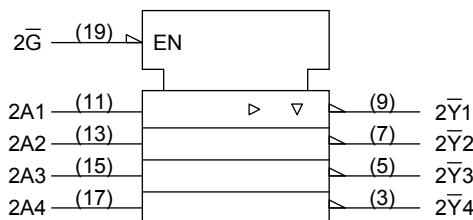
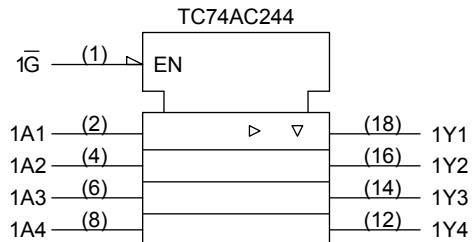
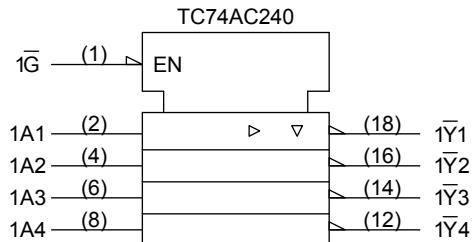
DIP20-P-300-2.54A	: 1.30 g (typ.)
SOP20-P-300-1.27A	: 0.22 g (typ.)
TSSOP20-P-0044-0.65A	: 0.08 g (typ.)

Start of commercial production
1986-05

Pin Assignment



IEC Logic Symbol



Truth Table

Inputs		Outputs	
\bar{G}	A_n	Y_n (244)	\bar{Y}_n (240)
L	L	L	H
L	H	H	L
H	X	Z	Z

X: Don't care

Z: High impedance

Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to 7.0	V
DC input voltage	V_{IN}	-0.5 to $V_{CC} + 0.5$	V
DC output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Input diode current	I_{IK}	± 20	mA
Output diode current	I_{OK}	± 50	mA
DC output current	I_{OUT}	± 50	mA
DC V_{CC} /ground current	I_{CC}	± 200	mA
Power dissipation	P_D	500 (DIP) (Note 2)/180 (SOP/TSSOP)	mW
Storage temperature	T_{STG}	-65 to 150	°C

Note 1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

Note 2: 500 mW in the range of $T_a = -40$ to 65°C . From $T_a = 65$ to 85°C , a derating factor of $-10 \text{ mW/}^\circ\text{C}$ should be applied up to 300 mW.

Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2.0 to 5.5	V
Input voltage	V_{IN}	0 to V_{CC}	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{OPR}	-40 to 85	°C
Input rise and fall time	dt/dV	0 to 100 ($V_{CC} = 3.3 \pm 0.3 \text{ V}$) 0 to 20 ($V_{CC} = 5 \pm 0.5 \text{ V}$)	ns/V

Note: The operating ranges must be maintained to ensure the normal operation of the device.
Unused inputs must be tied to either V_{CC} or GND.

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition	V _{CC} (V)	Ta = 25°C			Ta = -40 to 85°C		Unit	
				Min	Typ.	Max	Min	Max		
High-level input voltage	V _{IH}	—	2.0	1.50	—	—	1.50	—	V	
			3.0	2.10	—	—	2.10	—		
			5.5	3.85	—	—	3.85	—		
Low-level input voltage	V _{IL}	—	2.0	—	—	0.50	—	0.50	V	
			3.0	—	—	0.90	—	0.90		
			5.5	—	—	1.65	—	1.65		
High-level output voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50 µA	2.0	1.9	2.0	—	1.9	V	
			I _{OH} = -4 mA	3.0	2.9	3.0	—	2.9		
			I _{OH} = -24 mA	4.5	4.4	4.5	—	4.4		
		V _{IN} = V _{IH} or V _{IL}	I _{OH} = -75 mA (Note)	3.0	2.58	—	—	2.48	V	
			I _{OH} = 50 µA	4.5	3.94	—	—	3.80		
			I _{OH} = 12 mA	5.5	—	—	—	3.85		
			I _{OH} = 24 mA	—	—	—	—	—		
Low-level output voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 75 mA (Note)	2.0	—	0.0	0.1	—	V	
			I _{OL} = 50 µA	3.0	—	0.0	0.1	—		
			I _{OL} = 12 mA	4.5	—	0.0	0.1	—		
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	—	µA	
		V _{IN} = V _{CC} or GND		—	—	—	—	±5.0		
Input leakage current	I _{IN}	V _{IN} = V _{CC} or GND		5.5	—	—	±0.1	—	±1.0	µA
Quiescent supply current	I _{CC}	V _{IN} = V _{CC} or GND		5.5	—	—	8.0	—	80.0	µA

Note: This spec indicates the capability of driving 50 Ω transmission lines.

One output should be tested at a time for a 10 ms maximum duration.

AC Characteristics ($C_L = 50 \text{ pF}$, $R_L = 500 \Omega$, input: $t_r = t_f = 3 \text{ ns}$)

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit	
			V _{CC} (V)	Min	Typ.	Max	Min		
Propagation delay time (Note 2)	t _{pLH}	—	3.3 ± 0.3	—	6.3	10.5	1.0	12.0	ns
	t _{pHL}		5.0 ± 0.5	—	4.8	7.0	1.0	8.0	
Propagation delay time (Note 3)	t _{pLH}	—	3.3 ± 0.3	—	7.0	11.4	1.0	13.0	ns
	t _{pHL}		5.0 ± 0.5	—	5.2	7.5	1.0	8.5	
Output enable time	t _{pZL}	—	3.3 ± 0.3	—	8.4	14.0	1.0	16.0	ns
	t _{pZH}		5.0 ± 0.5	—	5.9	8.7	1.0	10.0	
Output disable time	t _{pLZ}	—	3.3 ± 0.3	—	6.4	10.5	1.0	12.0	ns
	t _{pHZ}		5.0 ± 0.5	—	5.5	7.9	1.0	9.0	
Input capacitance	C _{IN}	—	—	—	5	10	—	10	pF
Output capacitance	C _{OUT}	—	—	—	10	—	—	—	pF
Power dissipation capacitance	C _{PD}	(Note 1)		—	30	—	—	—	pF

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:

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

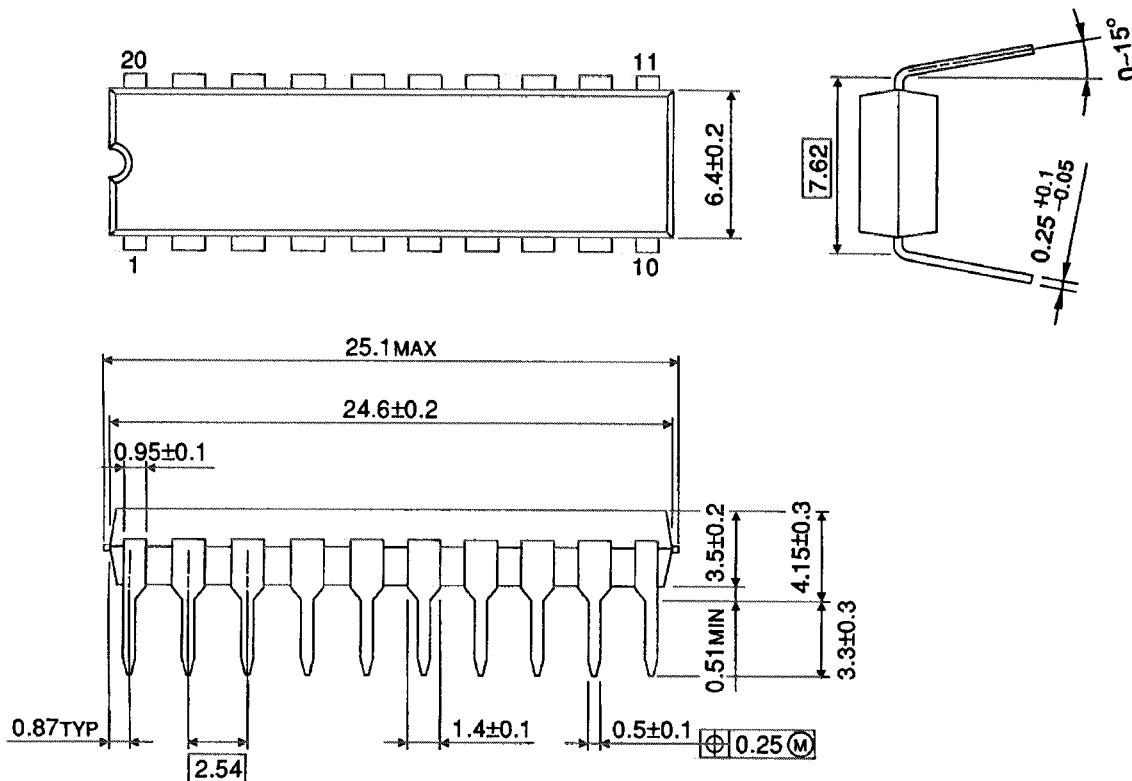
Note 2: For TC74AC240 only

Note 3: For TC74AC244 only

Package Dimensions

DIP20-P-300-2.54A

Unit : mm

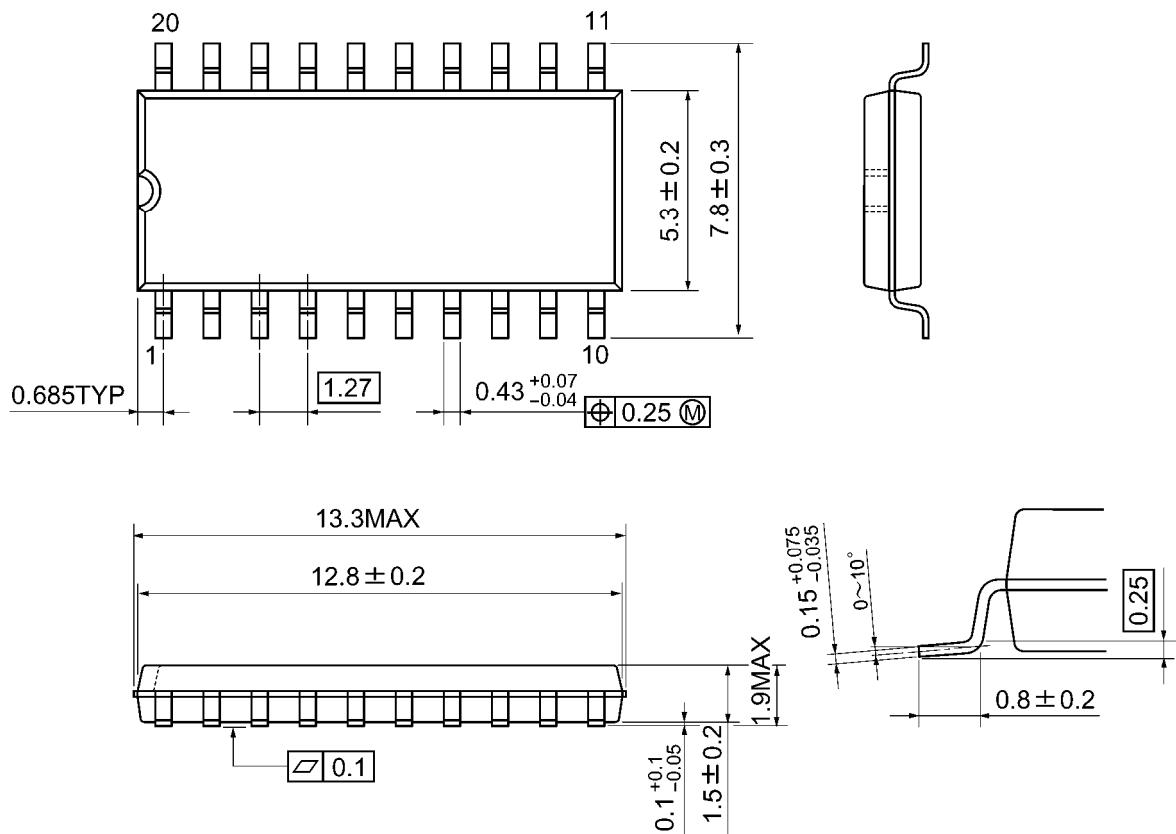


Weight: 1.30 g (typ.)

Package Dimensions

SOP20-P-300-1.27A

Unit: mm

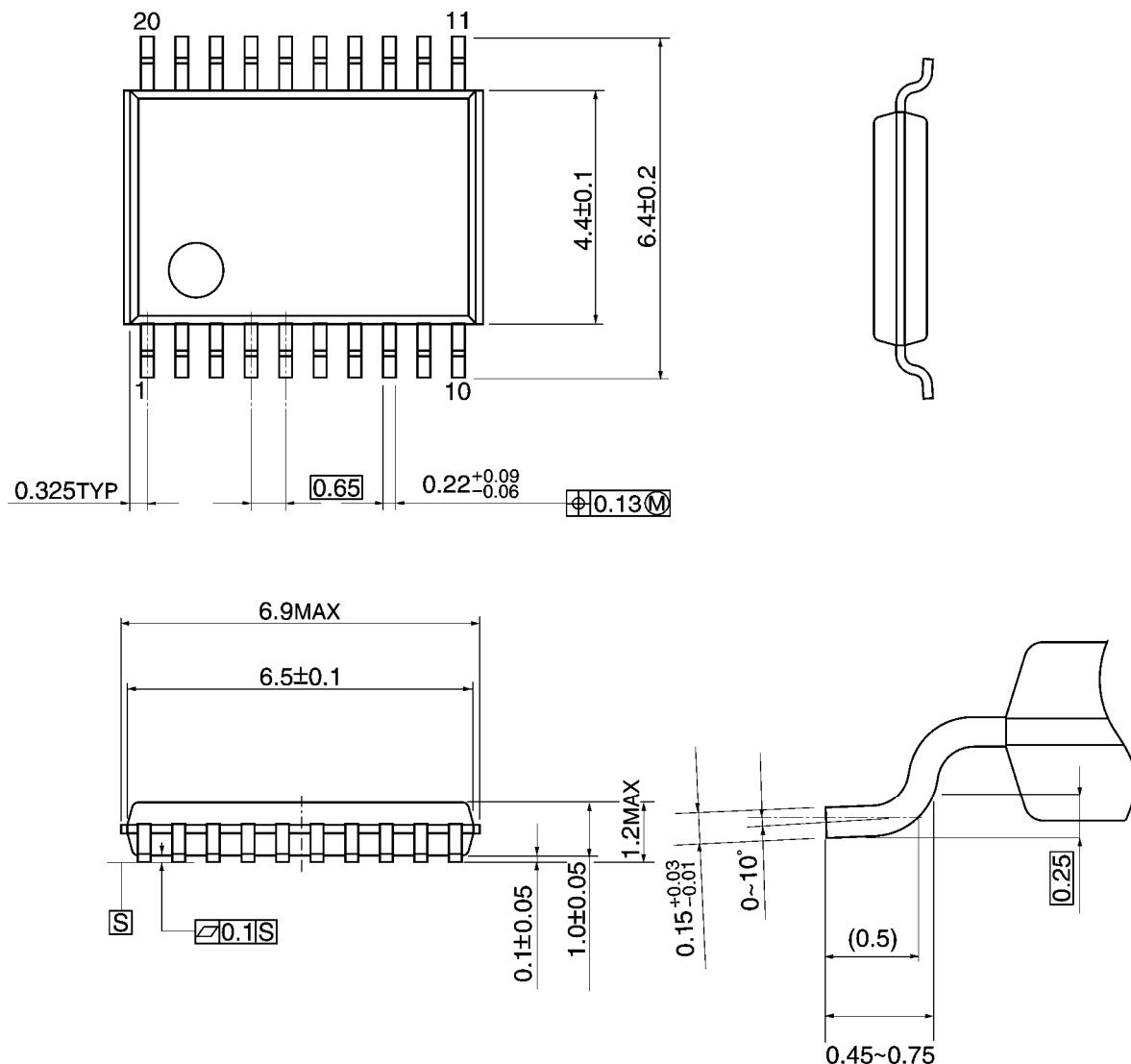


Weight: 0.22 g (typ.)

Package Dimensions

TSSOP20-P-0044-0.65A

Unit: mm



Weight: 0.08 g (typ.)

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