

TC74ACT240P,TC74ACT244P

1. Functional Description

- Octal Bus Buffer

TC74ACT240P: INVERTED, 3-STATE OUTPUTS

TC74ACT244P: NON-INVERTED, 3-STATE OUTPUTS

2. General

The TC74ACT240P and TC74ACT244P 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 TC74ACT240P is an inverting 3-state buffer while the TC74ACT244P is non-inverting. Both devices have two active-low output enables.

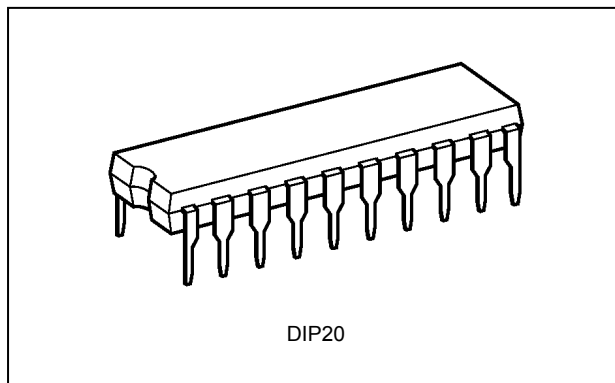
These devices are designed to be used in such applications as 3-state memory address drivers.

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

3. Features

- (1) High speed: Propagation delay time = 5.0 ns (typ.) at $V_{CC} = 5.0$ V
- (2) Low power dissipation: $I_{CC} = 8.0$ μ A (max) at $T_a = 25$ °C
- (3) Compatible with TTL outputs: $V_{IL} = 0.8$ V (max)
 $V_{IH} = 2.0$ V (min)
- (4) Output current: $|I_{OH}|/I_{OL} = 24$ mA (min) ($V_{CC} = 4.5$ V)
- (5) Balanced propagation delays: $t_{PLH} \approx t_{PHL}$
- (6) Pin and function compatible with 74F240/244.

4. Packaging

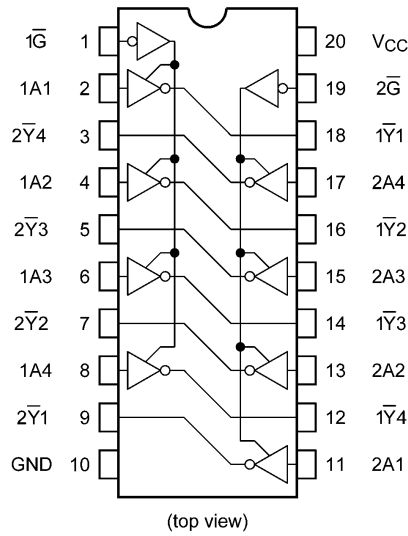


Start of commercial production

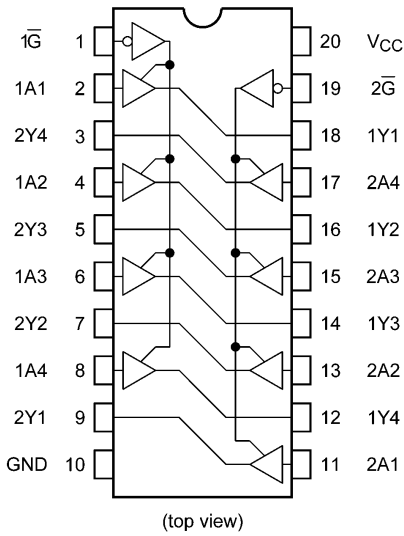
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5. Pin Assignment

TC74ACT240P

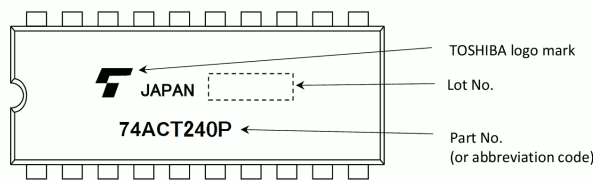


TC74ACT244P

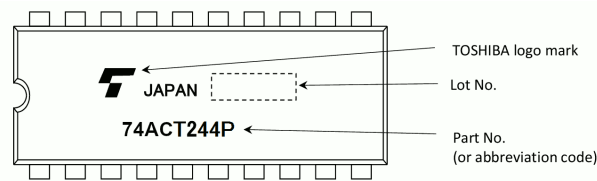


6. Marking

TC74ACT240P

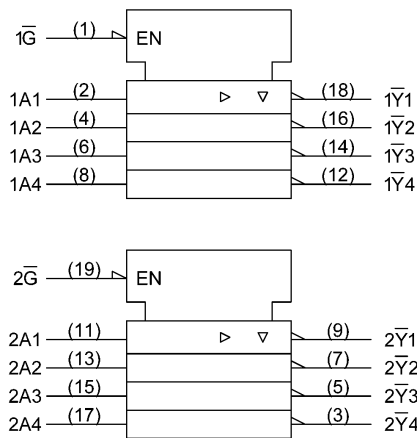


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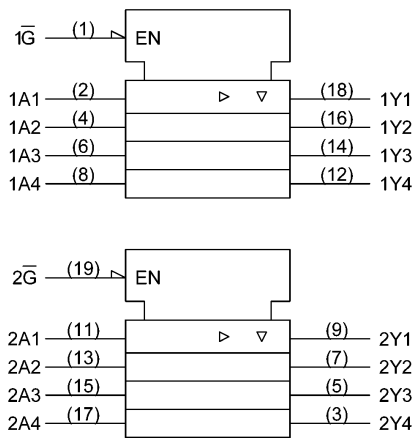


7. IEC Logic Symbol

TC74ACT240P



TC74ACT244P



8. Truth Table

| Input \bar{G} | Input A_n | Output Y_n (TC74ACT244P) | Output \bar{Y}_n (TC74ACT240P) |
|-----------------|-------------|-------------------------------|-------------------------------------|
| L | L | L | H |
| L | H | H | L |
| H | X | Z | Z |

X: Don't care

Z: High impedance

9. Absolute Maximum Ratings (Note)

| Characteristics | Symbol | Note | Rating | Unit |
|--------------------------|-----------|----------|------------------------|------|
| Supply voltage | V_{CC} | | -0.5 to 7.0 | V |
| Input voltage | V_{IN} | | -0.5 to $V_{CC} + 0.5$ | V |
| 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 |
| Output current | I_{OUT} | | ± 50 | mA |
| V_{CC} /ground current | I_{CC} | | ± 200 | mA |
| Power dissipation | P_D | (Note 1) | 500 | mW |
| Storage temperature | T_{stg} | | -65 to 150 | °C |

Note: 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 1: 500 mW in the range of $T_a = -40$ to 65 °C. From $T_a = 65$ to 85 °C a derating factor of -10 mW/°C shall be applied until 300 mW.

10. Operating Ranges (Note)

| Characteristics | Symbol | Rating | Unit |
|---------------------------|-----------|---------------|------|
| Supply voltage | V_{CC} | 4.5 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 times | dt/dv | 0 to 10 | 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.

11. Electrical Characteristics

11.1. DC Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

| Characteristics | Symbol | Test Condition | V_{CC} (V) | Min | Typ. | Max | Unit |
|--|-----------|--|-----------------------------------|-----|------|-----------|---------------|
| High-level input voltage | V_{IH} | — | 4.5 to 5.5 | 2.0 | — | — | V |
| Low-level input voltage | V_{IL} | — | 4.5 to 5.5 | — | — | 0.8 | V |
| High-level output voltage | V_{OH} | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OH} = -50\text{ }\mu\text{A}$ | 4.5 | 4.4 | 4.5 | V |
| | | | $I_{OH} = -24\text{ mA}$ | 4.5 | 3.94 | — | |
| Low-level output voltage | V_{OL} | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OL} = 50\text{ }\mu\text{A}$ | 4.5 | — | 0.0 | V |
| | | | $I_{OL} = 24\text{ mA}$ | 4.5 | — | 0.36 | |
| 3-state output OFF-state leakage current | I_{OZ} | $V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND | 5.5 | — | — | ± 0.5 | μA |
| Input leakage current | I_{IN} | $V_{IN} = V_{CC}$ or GND | 5.5 | — | — | ± 0.1 | μA |
| Quiescent supply current | I_{CC} | $V_{IN} = V_{CC}$ or GND | 5.5 | — | — | 8.0 | μA |
| | I_{CCT} | Per input: $V_{IN} = 3.4\text{ V}$ Other input: V_{CC} or GND | 5.5 | — | — | 1.35 | mA |

11.2. DC Characteristics (Unless otherwise specified, $T_a = -40\text{ to }85\text{ }^{\circ}\text{C}$)

| Characteristics | Symbol | Test Condition | Note | V_{CC} (V) | Min | Max | Unit |
|--|-----------|--|-----------------------------------|--------------|------|-----------|---------------|
| High-level input voltage | V_{IH} | — | | 4.5 to 5.5 | 2.0 | — | V |
| Low-level input voltage | V_{IL} | — | | 4.5 to 5.5 | — | 0.8 | V |
| High-level output voltage | V_{OH} | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OH} = -50\text{ }\mu\text{A}$ | 4.5 | 4.4 | — | V |
| | | | $I_{OH} = -24\text{ mA}$ | 4.5 | 3.80 | — | |
| | | | $I_{OH} = -75\text{ mA}$ (Note 1) | 5.5 | 3.85 | — | |
| Low-level output voltage | V_{OL} | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OL} = 50\text{ }\mu\text{A}$ | 4.5 | — | 0.1 | V |
| | | | $I_{OL} = 24\text{ mA}$ | 4.5 | — | 0.44 | |
| | | | $I_{OL} = 75\text{ mA}$ (Note 1) | 5.5 | — | 1.65 | |
| 3-state output OFF-state leakage current | I_{OZ} | $V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND | | 5.5 | — | ± 5.0 | μA |
| Input leakage current | I_{IN} | $V_{IN} = V_{CC}$ or GND | | 5.5 | — | ± 1.0 | μA |
| Quiescent supply current | I_{CC} | $V_{IN} = V_{CC}$ or GND | | 5.5 | — | 80.0 | μA |
| | I_{CCT} | Per input: $V_{IN} = 3.4\text{ V}$ Other input: V_{CC} or GND | | 5.5 | — | 1.50 | mA |

Note 1: This spec indicates the capability of driving 50 Ω transmission lines.

One output should be tested within a 10 ms maximum duration.

11.3. AC Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$, Input: $t_r = t_f = 3\text{ ns}$)

| Characteristics | Part Number | Symbol | Note | Test Condition | V_{CC} (V) | Min | Typ. | Max | Unit |
|-------------------------------|-------------|--------------------|----------|---|---------------|-----|------|-----|------|
| Propagation delay time | | t_{PLH}, t_{PHL} | | $C_L = 50\text{ pF}$ $R_L = 500\text{ }\Omega$ | 5.0 ± 0.5 | — | 5.7 | 8.0 | ns |
| 3-state output enable time | | t_{PZL}, t_{PZH} | | $C_L = 50\text{ pF}$ $R_L = 500\text{ }\Omega$ | 5.0 ± 0.5 | — | 6.0 | 9.0 | ns |
| 3-state output disable time | | t_{PLZ}, t_{PHZ} | | $C_L = 50\text{ pF}$ $R_L = 500\text{ }\Omega$ | 5.0 ± 0.5 | — | 5.9 | 8.5 | ns |
| Input capacitance | | C_{IN} | | — | — | — | 5 | 10 | pF |
| Output capacitance | | C_{OUT} | | — | — | — | 10 | — | pF |
| Power dissipation capacitance | TC74ACT240P | C_{PD} | (Note 1) | — | — | — | 25 | — | pF |
| | TC74ACT244P | | (Note 1) | — | — | — | 29 | — | |

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.

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

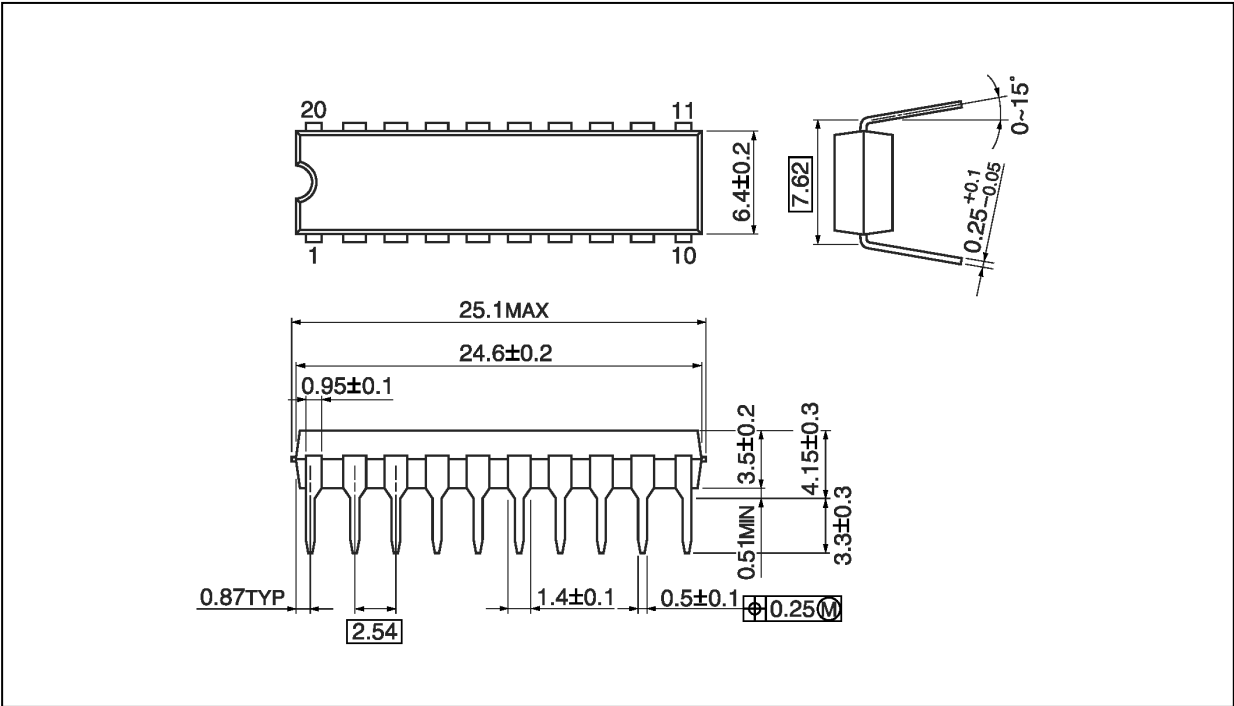
11.4. AC Characteristics

(Unless otherwise specified, $T_a = -40$ to 85 °C, Input: $t_r = t_f = 3$ ns)

| Characteristics | Symbol | Test Condition | V_{CC} (V) | Min | Max | Unit |
|-----------------------------|--------------------|---------------------------------------|---------------|-----|------|------|
| Propagation delay time | t_{PLH}, t_{PHL} | $C_L = 50$ pF $R_L = 500$ Ω | 5.0 ± 0.5 | 1.0 | 9.0 | ns |
| 3-state output enable time | t_{PZL}, t_{PZH} | $C_L = 50$ pF $R_L = 500$ Ω | 5.0 ± 0.5 | 1.0 | 10.5 | ns |
| 3-state output disable time | t_{PLZ}, t_{PHZ} | $C_L = 50$ pF $R_L = 500$ Ω | 5.0 ± 0.5 | 1.0 | 10.0 | ns |
| Input capacitance | C_{IN} | — | — | — | 10 | pF |

Package Dimensions

Unit: mm



Weight: 1.30 g (typ.)

| Package Name(s) |
|-----------------|
| Nickname: DIP20 |

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