

TC74HCT7007AP, TC74HCT7007AF

Hex Buffer

The TC74HCT7007A is a high speed CMOS BUFFER fabricated with silicon gate C²MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

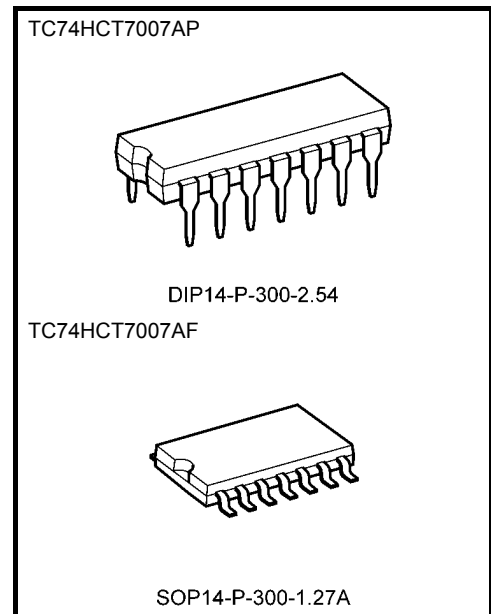
This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

The internal circuit is composed of 4 stages including a buffer output, which provides high noise immunity and stable output.

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

Features

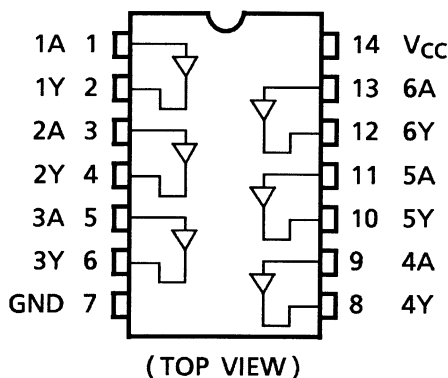
- High speed: $t_{pd} = 11 \text{ ns (typ.)}$ at $V_{CC} = 5 \text{ V}$
- Low power dissipation: $I_{CC} = 1 \mu\text{A (max)}$ at $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs: $V_{IH} = 2 \text{ V (min)}$
 $V_{IL} = 0.8 \text{ V (max)}$
- Wide interfacing ability: LSTTL, NMOS, CMOS
- Output drive capability: 10 LSTTL loads
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 4 \text{ mA (min)}$
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Pin and function compatible with 74LS07



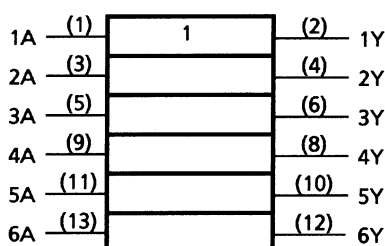
Weight

| | |
|-------------------|-----------------|
| DIP14-P-300-2.54 | : 0.96 g (typ.) |
| SOP14-P-300-1.27A | : 0.18 g (typ.) |

Pin Assignment



IEC Logic Symbol



Start of commercial production
1987-11

Truth Table

| | |
|---|---|
| A | Y |
| L | L |
| H | H |

Absolute Maximum Ratings (Note 1)

| Characteristics | Symbol | Rating | Unit |
|-----------------------------|-----------|------------------------------|-------------|
| Supply voltage range | V_{CC} | -0.5 to 7 | 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} | ± 20 | mA |
| DC output current | I_{OUT} | ± 25 | mA |
| DC V_{CC} /ground current | I_{CC} | ± 50 | mA |
| Power dissipation | P_D | 500 (DIP) (Note 2)/180 (SOP) | mW |
| Storage temperature | T_{stg} | -65 to 150 | $^{\circ}C$ |

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 $T_a = -40^{\circ}C$ to $65^{\circ}C$. From $T_a = 65^{\circ}C$ to $85^{\circ}C$ a derating factor of -10 mW/ $^{\circ}C$ shall be applied until 300 mW.

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 | $^{\circ}C$ |
| Input rise and fall time | t_r, t_f | 0 to 500 | ns |

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 | | Ta = 25°C | | | Ta = -40 to 85°C | | Unit | |
|---------------------------|-----------------|--|--------------------------|---------------------|------|------|------------------|------|------|-----|
| | | | | V _{CC} (V) | Min | Typ. | Max | Min | | Max |
| High-level input voltage | V _{IH} | — | | 4.5 to 5.5 | 2.0 | — | — | 2.0 | — | V |
| Low-level input voltage | V _{IL} | — | | 4.5 to 5.5 | — | — | 0.8 | — | 0.8 | V |
| High-level output voltage | V _{OH} | V _{IN} = V _{IH} or V _{IL} | I _{OH} = -20 μA | 4.5 | 4.4 | 4.5 | — | 4.4 | — | V |
| | | | I _{OH} = -4 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 μA | 4.5 | — | 0.0 | 0.1 | — | 0.1 | V |
| | | | I _{OL} = 4 mA | 4.5 | — | 0.17 | 0.26 | — | 0.33 | |
| 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 | — | — | 1.0 | — | 10.0 | μA |
| | I _C | Per input: V _{IN} = 0.5 V or 2.4 V Other input: V _{CC} or GND | | 5.5 | — | — | 2.0 | — | 2.9 | mA |

AC Characteristics (C_L = 15 pF, V_{CC} = 5 V, Ta = 25°C, input: t_r = t_f = 6 ns)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|------------------------|------------------|----------------|-----|------|-----|------|
| Output transition time | t _{TLH} | — | — | 6 | 12 | ns |
| | t _{THL} | | | | | |
| Propagation delay time | t _{pLH} | — | — | 11 | 17 | ns |
| | t _{pHL} | | | | | |

AC Characteristics (C_L = 50 pF, input: t_r = t_f = 6 ns)

| Characteristics | Symbol | Test Condition | | Ta = 25°C | | | Ta = -40 to 85°C | | Unit | |
|-------------------------------|---------------------------|----------------|--|---------------------|-----|------|------------------|-----|------|-----|
| | | | | V _{CC} (V) | Min | Typ. | Max | Min | | Max |
| Output transition time | t _{TLH} | — | | 4.5 | — | 8 | 15 | — | 19 | ns |
| | t _{THL} | | | 5.5 | — | 7 | 14 | — | 18 | |
| Propagation delay time | t _{pLH} | — | | 4.5 | — | 14 | 23 | — | 28 | ns |
| | t _{pHL} | | | 5.5 | — | 12 | 21 | — | 26 | |
| Input capacitance | C _{IN} | — | | — | 5 | 10 | — | 10 | pF | |
| Power dissipation capacitance | C _{PD} (Note) | — | | — | 22 | — | — | — | pF | |

Note: 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:

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/6 \text{ (per gate)}$$

Package Dimensions

DIP14-P-300-2.54

Unit : mm

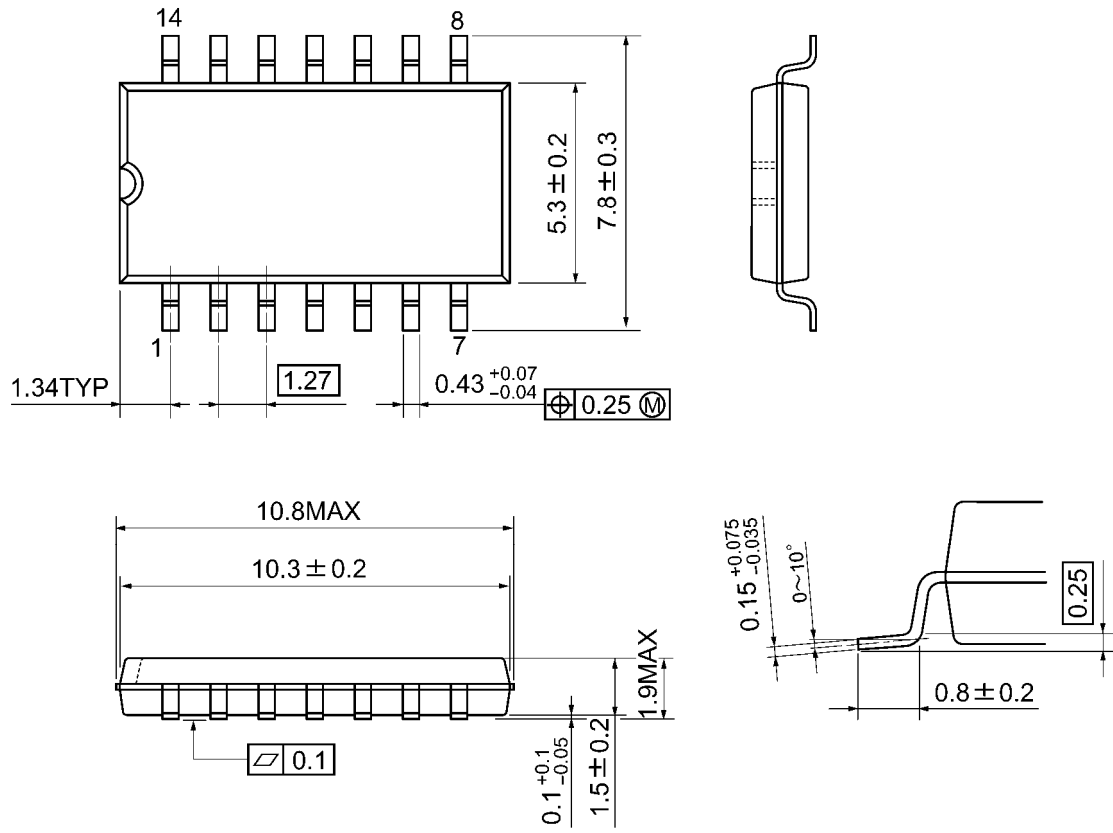


Weight: 0.96 g (typ.)

Package Dimensions

SOP14-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

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