

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74HCT7007AP, TC74HCT7007AF

HEX BUFFER

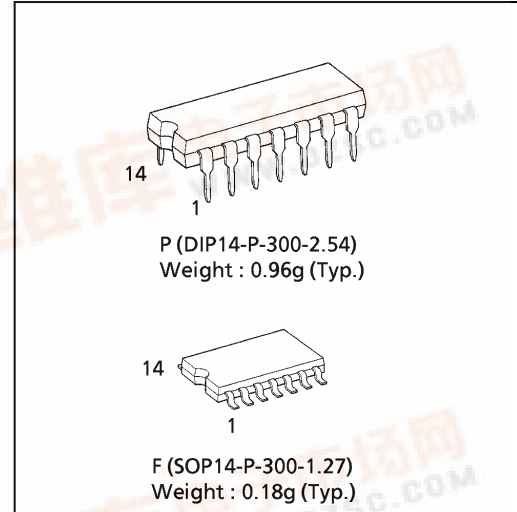
The TC74HCT7007A is a high speed CMOS BUFFER fabricated with silicon gate C²MOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The 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.

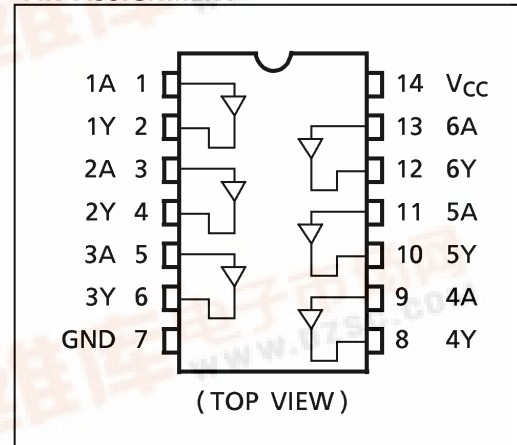
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES :

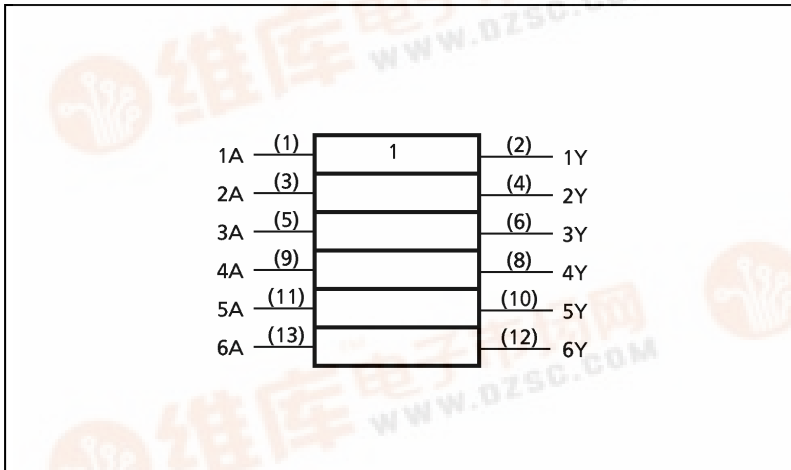
- High Speed..... $t_{pd} = 11\text{ns}(\text{typ.})$ at $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 1\mu\text{A}(\text{Max.})$ at $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs... $V_{IH} = 2\text{V}(\text{Min.})$
 $V_{IL} = 0.8\text{V}(\text{Max.})$
- Wide Interfacing ability.....LSTTL, NMOS, CMOS
- Output Drive Capability.....10 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = I_{OL} = 4\text{mA}(\text{Min.})$
- Balanced Propagation Delays... $t_{pLH} \approx t_{pHL}$
- Pin and Function Compatible with 74LS07



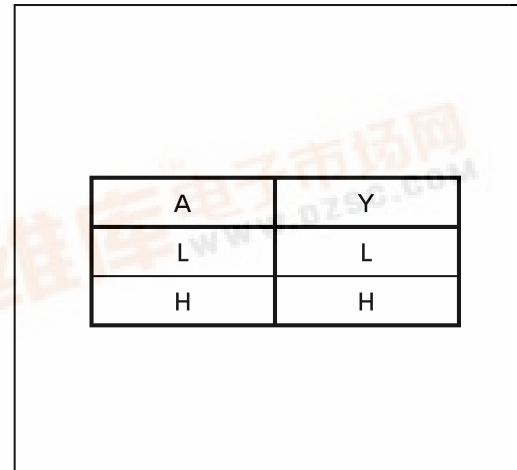
PIN ASSIGNMENT



IEC LOGIC SYMBOL



PIN ASSIGNMENT



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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} | ± 25 | mA |
| DC V_{CC} /Ground Current | I_{CC} | ± 50 | 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°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 |
| | | | $I_{OH} = -4 \text{ mA}$ | 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 |
| | | | $I_{OL} = 4 \text{ mA}$ | 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 | mA | |
| | I_C | PER INPUT: $V_{IN} = 0.5\text{V}$ or 2.4V OTHER INPUT: V_{CC} or GND | 5.5 | — | — | 2.0 | — | 2.9 | | |

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AC ELECTRICAL CHARACTERISTICS ($C_L = 15\text{pF}$, $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$, Input $t_r = t_f = 6\text{ns}$)

| PARAMETER | 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 ELECTRICAL CHARACTERISTICS ($C_L = 50\text{pF}$, Input $t_r = t_f = 6\text{ns}$)

| 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. | |
| 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 | $C_{PD} (1)$ | | | — | 22 | — | — | — | |

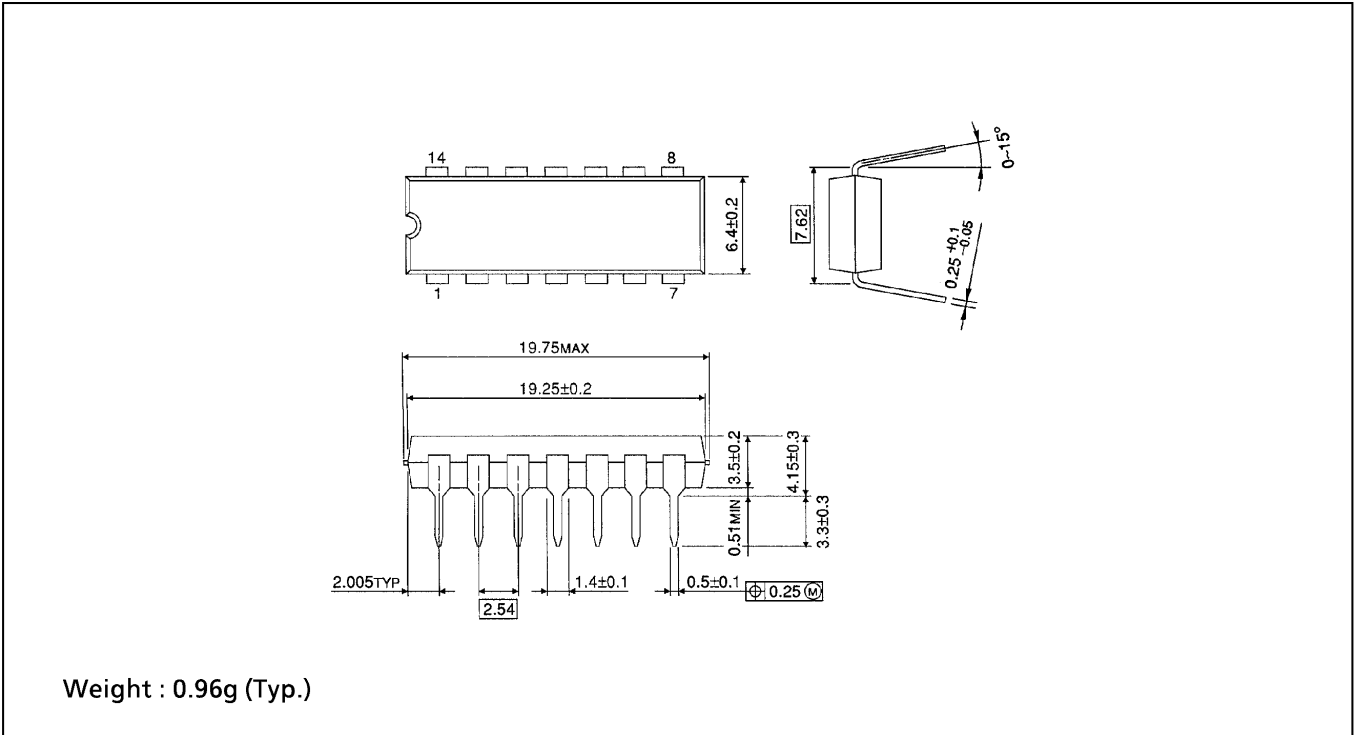
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

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

DIP 14PIN OUTLINE DRAWING (DIP14-P-300-2.54)

Unit in mm



SOP 14PIN (200mil BODY) OUTLINE DRAWING (SOP14-P-300-1.27)

Unit in mm

