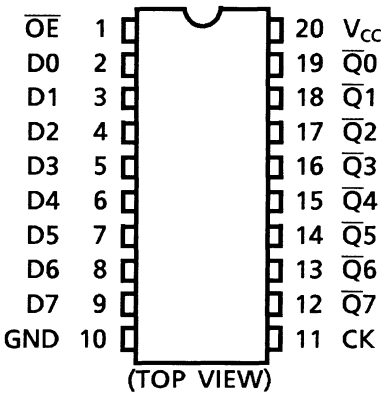
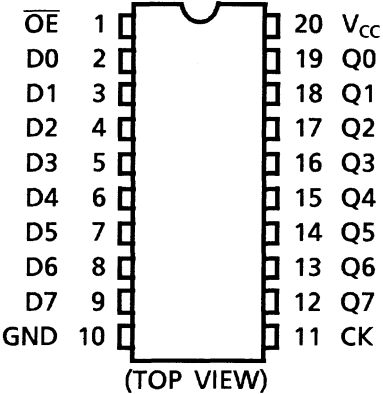


Pin Assignment

TC74HC564A

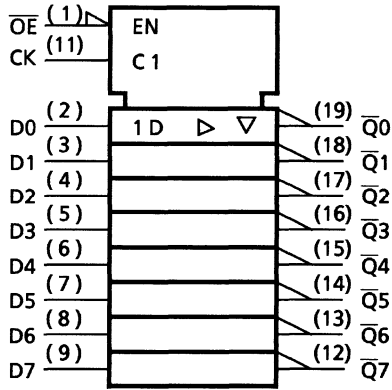


TC74HC574A

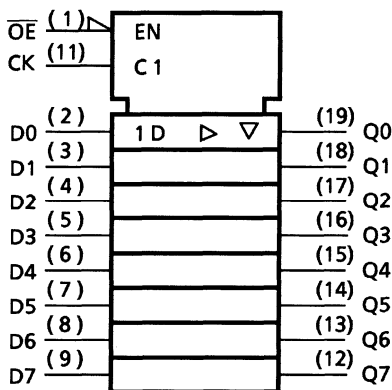


IEC Logic Symbol

TC74HC564A



TC74HC574A



Truth Table

| Inputs | | | Outputs | |
|--------|----|---|----------------|-----------------|
| OE | CK | D | Q (574A) | Q̄ (564A) |
| H | X | X | Z | Z |
| L | | X | Q _n | Q̄ _n |
| L | | L | L | H |
| L | | H | H | L |

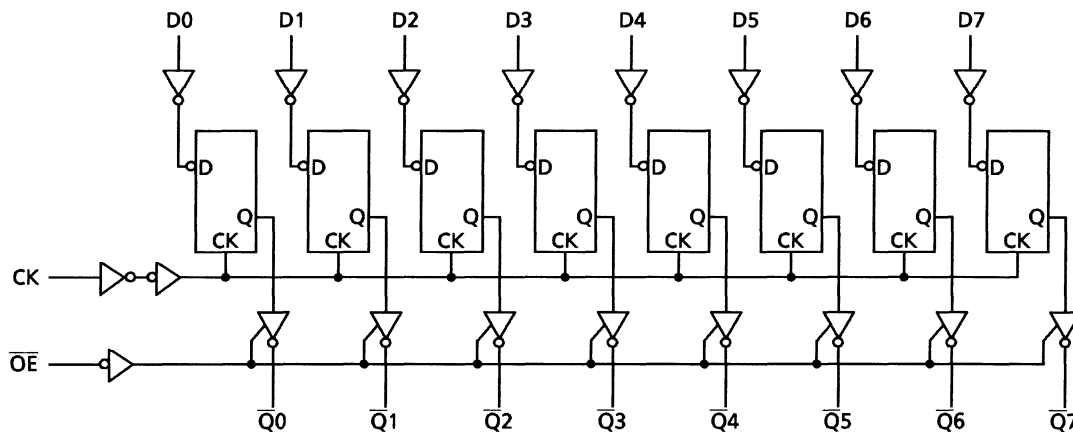
X: Don't care

Z: High impedance

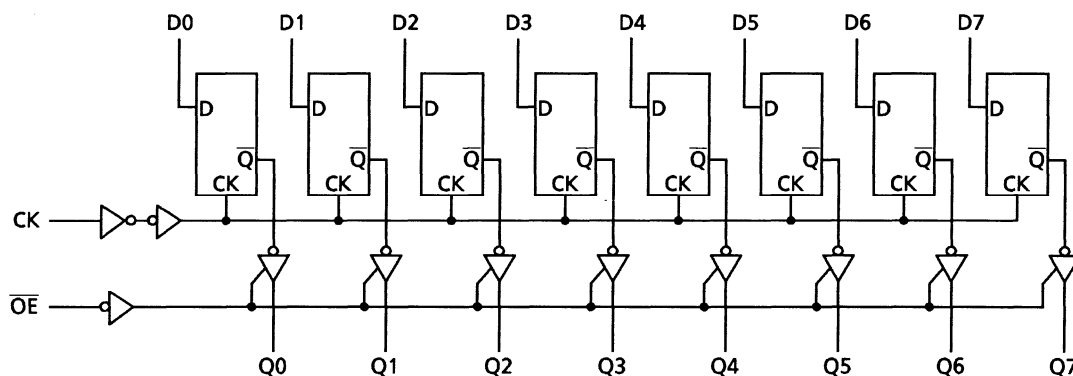
Q_n (Q̄_n): No change

System Diagram

TC74HC564A



TC74HC574A



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} | ± 35 | mA |
| DC V_{CC} /ground current | I_{CC} | ± 75 | mA |
| Power dissipation | P_D | 500 (DIP) (Note 2)/180 (SOP) | mW |
| Storage temperature | T_{stg} | -65 to 150 | $^{\circ}\text{C}$ |

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 mW/ $^{\circ}\text{C}$ shall be applied until 300 mW.

Operating Ranges (Note)

| Characteristics | Symbol | Rating | Unit |
|--------------------------|------------|---|------|
| Supply voltage | V_{CC} | 2 to 6 | 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 | t_r, t_f | 0 to 1000 ($V_{CC} = 2.0$ V) 0 to 500 ($V_{CC} = 4.5$ V) 0 to 400 ($V_{CC} = 6.0$ V) | 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} | — | | 2.0 4.5 6.0 | 1.50 3.15 4.20 | — — — | — — — | 1.50 3.15 4.20 | V | |
| Low-level input voltage | V _{IL} | — | | 2.0 4.5 6.0 | — — — | — — — | 0.50 1.35 1.80 | — — — | 0.50 1.35 1.80 | V |
| High-level output voltage | V _{OH} | V _{IN} = V _{IH} or V _{IL} | I _{OH} = −20 μA | 2.0 | 1.9 | 2.0 | — | 1.9 | — | V |
| | | | | 4.5 | 4.4 | 4.5 | — | 4.4 | — | |
| | | | I _{OH} = −6 mA I _{OH} = −7.8 mA | 6.0 | 5.9 | 6.0 | — | 5.9 | — | |
| | | | | 4.5 6.0 | 4.18 5.68 | 4.31 5.80 | — — | 4.13 5.63 | — — | |
| Low-level output voltage | V _{OL} | V _{IN} = V _{IH} or V _{IL} | I _{OL} = 20 μA | 2.0 | — | 0.0 | 0.1 | — | 0.1 | V |
| | | | | 4.5 | — | 0.0 | 0.1 | — | 0.1 | |
| | | | I _{OL} = 6 mA I _{OL} = 7.8 mA | 6.0 | — | 0.0 | 0.1 | — | 0.1 | |
| | | | | 4.5 6.0 | — — | 0.17 0.18 | 0.26 0.26 | — — | 0.33 0.33 | |
| 3-state output off-state current | I _{OZ} | V _{IN} = V _{IH} or V _{IL} V _{OUT} = V _{CC} or GND | | 6.0 | — | — | ±0.5 | — | ±5.0 | μA |
| Input leakage current | I _{IN} | V _{IN} = V _{CC} or GND | | 6.0 | — | — | ±0.1 | — | ±1.0 | μA |
| Quiescent supply current | I _{CC} | V _{IN} = V _{CC} or GND | | 6.0 | — | — | 4.0 | — | 40.0 | μA |

Timing Requirements (input: $t_r = t_f = 6 \text{ ns}$)

| Characteristics | Symbol | Test Condition | Ta = 25°C | | Ta = -40 to 85°C | Unit |
|-----------------------------|------------------------|----------------|---------------------|------|------------------------|------|
| | | | V _{CC} (V) | Typ. | Limit | |
| Minimum pulse width (CK) | t_W (H) t_W (L) | — | 2.0 | — | 75 | ns |
| | | | 4.5 | — | 15 | |
| | | | 6.0 | — | 13 | |
| Minimum set-up time (Dn) | t_s | — | 2.0 | — | 75 | ns |
| | | | 4.5 | — | 15 | |
| | | | 6.0 | — | 13 | |
| Minimum hold time (Dn) | t_h | — | 2.0 | — | 0 | ns |
| | | | 4.5 | — | 0 | |
| | | | 6.0 | — | 0 | |
| Clock frequency | f | — | 2.0 | — | 6 | MHz |
| | | | 4.5 | — | 31 | |
| | | | 6.0 | — | 36 | |

AC Characteristics (input: $t_r = t_f = 6 \text{ ns}$)

| Characteristics | Symbol | Test Condition | | | Ta = 25°C | | | Ta = -40 to 85°C | | Unit |
|--|------------------------|---------------------------|---------|---------------------|-----------|------|-----|------------------|-----|------|
| | | | CL (pF) | V _{CC} (V) | Min | Typ. | Max | Min | Max | |
| Output transition time | t_{TLH} t_{THL} | — | 50 | 2.0 | — | 25 | 60 | — | 75 | ns |
| | | | | 4.5 | — | 7 | 12 | — | 15 | |
| | | | | 6.0 | — | 6 | 10 | — | 13 | |
| Propagation delay time (CK-Q, \bar{Q}) | t_{pLH} t_{pHL} | — | 50 | 2.0 | — | 70 | 150 | — | 190 | ns |
| | | | | 4.5 | — | 20 | 30 | — | 38 | |
| | | | | 6.0 | — | 15 | 26 | — | 33 | |
| | | | 150 | 2.0 | — | 88 | 190 | — | 240 | |
| | | | | 4.5 | — | 25 | 38 | — | 48 | |
| | | | | 6.0 | — | 19 | 33 | — | 41 | |
| Output enable time | t_{pZL} t_{pZH} | $R_L = 1 \text{ k}\Omega$ | 50 | 2.0 | — | 48 | 125 | — | 155 | ns |
| | | | | 4.5 | — | 15 | 25 | — | 31 | |
| | | | | 6.0 | — | 12 | 21 | — | 26 | |
| | | | 150 | 2.0 | — | 60 | 165 | — | 205 | |
| | | | | 4.5 | — | 20 | 33 | — | 41 | |
| | | | | 6.0 | — | 16 | 28 | — | 35 | |
| Output disable time | t_{pLZ} t_{pHZ} | $R_L = 1 \text{ k}\Omega$ | 50 | 2.0 | — | 34 | 125 | — | 155 | ns |
| | | | | 4.5 | — | 17 | 25 | — | 31 | |
| | | | | 6.0 | — | 15 | 21 | — | 26 | |
| Maximum clock frequency | f_{\max} | — | 50 | 2.0 | 6 | 17 | — | 5 | — | MHz |
| | | | | 4.5 | 31 | 50 | — | 24 | — | |
| | | | | 6.0 | 36 | 59 | — | 28 | — | |
| Input capacitance | C_{IN} | — | — | — | — | 5 | 10 | — | 10 | pF |
| Output capacitance | C_{OUT} | — | — | — | — | 10 | — | — | — | pF |
| Power dissipation capacitance | C_{PD} (Note) | — | — | — | — | 54 | — | — | — | 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:

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

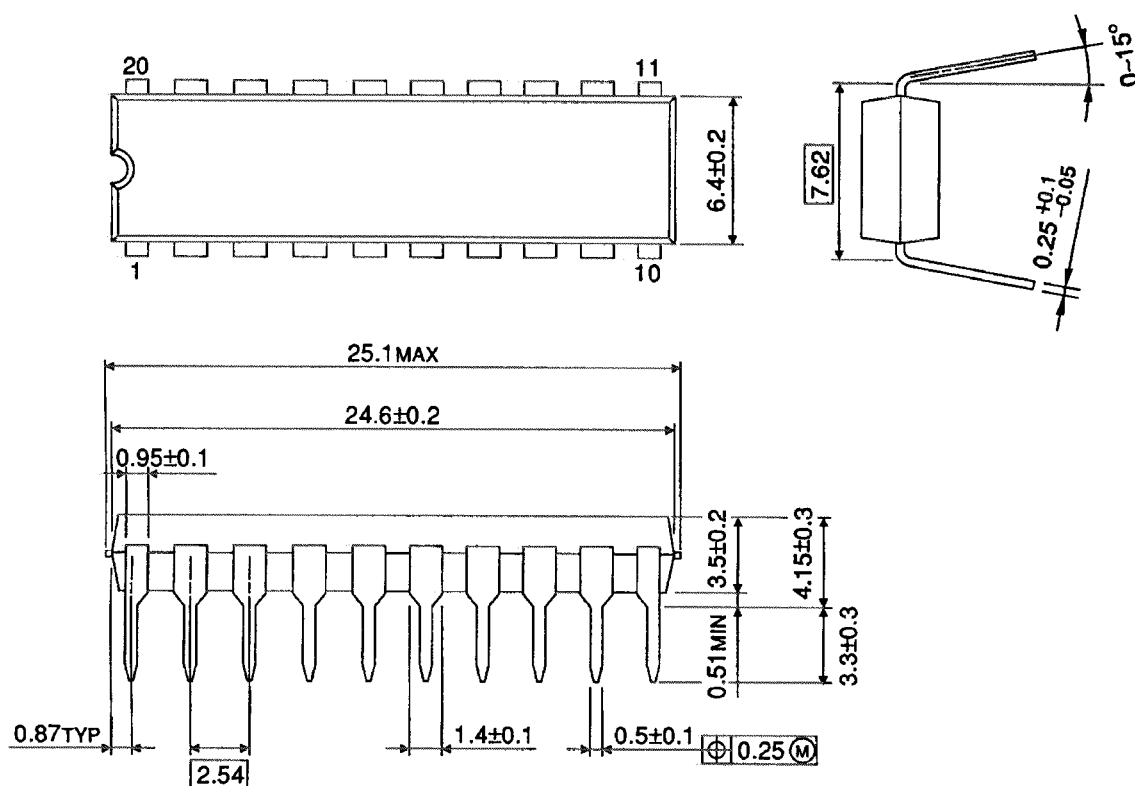
And the total C_{PD} when n pcs. of flip flop operate can be gained by the following equation:

$$C_{PD}(\text{total}) = 39 + 15 \cdot n$$

Package Dimensions

DIP20-P-300-2.54A

Unit : mm

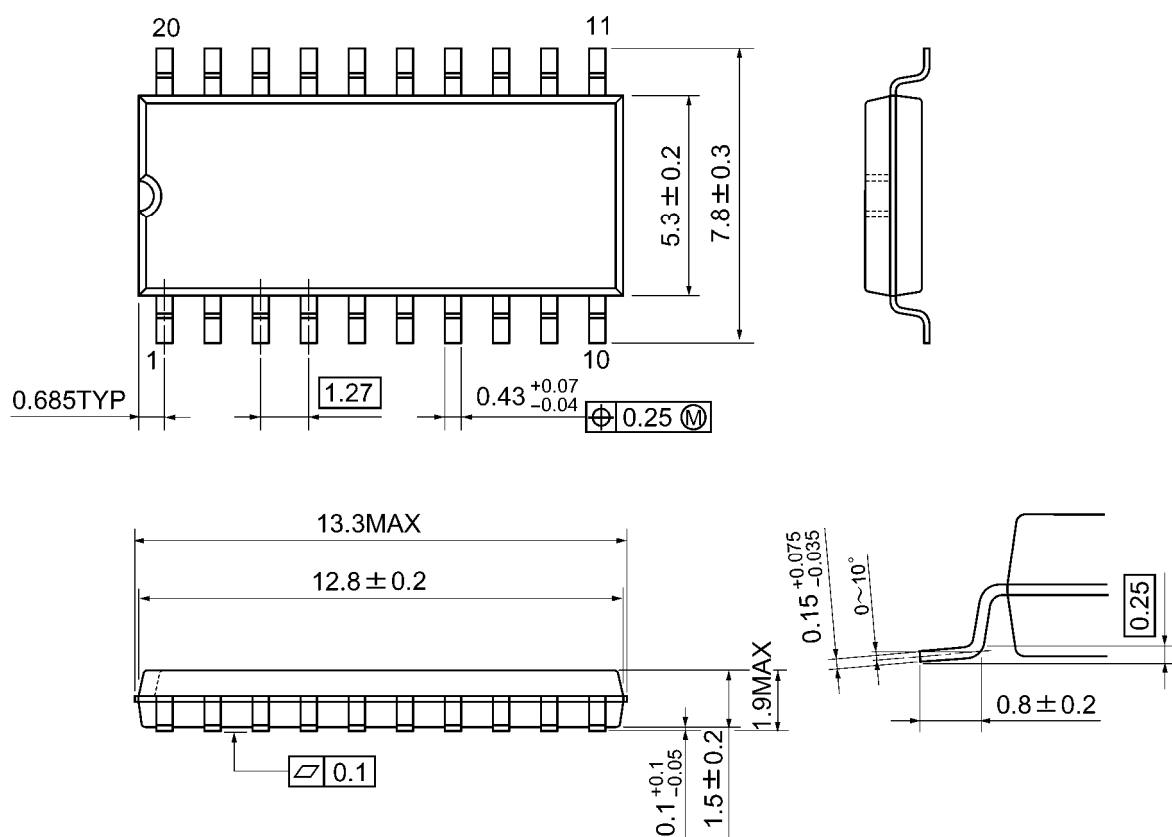


Weight: 1.30 g (typ.)

Package Dimensions

SOP20-P-300-1.27A

Unit: mm



Weight: 0.22 g (typ.)

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