# DATA SHEET

For a complete data sheet, please also download:

- The IC06 74HC/HCT/HCU/HCMOS Logic Family Specifications
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Information
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Outlines

## 74HC/HCT574

Octal D-type flip-flop; positive edge-trigger; 3-state

Product specification
File under Integrated Circuits, IC06

December 1990

Philips Semiconductors

PHILIPS

# Octal D-type flip-flop; positive edge-trigger; 3-state

# 74HC/HCT574

## FEATURES

- 3-state non-inverting outputs for bus oriented applications
- 8-bit positive edge-triggered register
- Common 3-state output enable input
- Independent register and 3-state buffer operation
- Output capability: bus driver
- $I_{CC}$ category: MSI

## GENERAL DESCRIPTION

The 74HC/HCT574 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT574 are octal D-type flip-flops featuring separate D-type inputs for each flip-flop and non-inverting 3-state outputs for bus oriented applications. A clock (CP) and an output enable ($\overline{OE}$) input are common to all flip-flops.

The 8 flip-flops will store the state of their individual D-inputs that meet the set-up and hold time requirements on the LOW-to-HIGH CP transition.
When $\overline{OE}$ is LOW, the contents of the 8 flip-flops are available at the outputs.
When $\overline{OE}$ is HIGH, the outputs go to the high impedance OFF-state.
Operation of the $\overline{OE}$ input does not affect the state of the flip-flops.

The “574” is functionally identical to the “564”, but has non-inverting outputs.
The “574” is functionally identical to the “374”, but has a different pinning.

## QUICK REFERENCE DATA

GND = 0 V; $T_{amb}$ = 25 °C; $t_r = t_f$ = 6 ns

| SYMBOL | PARAMETER | CONDITIONS | TYPICAL | | UNIT |
|---|---|---|---|---|---|
| | | | HC | HCT | |
| $t_{PHL}/ t_{PLH}$ | propagation delay CP to $Q_n$ | $C_L$ = 15 pF; $V_{CC}$ = 5 V | 14 | 15 | ns |
| $f_{max}$ | maximum clock frequency | | 123 | 76 | MHz |
| $C_I$ | input capacitance | | 3.5 | 3.5 | pF |
| $C_{PD}$ | power dissipation capacitance per flip-flop | notes 1 and 2 | 22 | 25 | pF |

### Notes

1. $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in µW):

   $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ where:

   $f_i$ = input frequency in MHz

   $f_o$ = output frequency in MHz

   $\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs

   $C_L$ = output load capacitance in pF

   $V_{CC}$ = supply voltage in V

2. For HC the condition is $V_I$ = GND to $V_{CC}$
   For HCT the condition is $V_I$ = GND to $V_{CC}$ – 1.5 V

## ORDERING INFORMATION

See *“74HC/HCT/HCU/HCMOS Logic Package Information”*.

**PIN DESCRIPTION**

| PIN NO. | SYMBOL | NAME AND FUNCTION |
|---|---|---|
| 1 | $\overline{OE}$ | 3-state output enable input (active LOW) |
| 2, 3, 4, 5, 6, 7, 8, 9 | $D_0$ to $D_7$ | data inputs |
| 10 | GND | ground (0 V) |
| 11 | CP | clock input (LOW-to-HIGH, edge-triggered) |
| 19, 18, 17, 16, 15, 14, 13, 12 | $Q_0$ to $Q_7$ | 3-state flip-flop outputs |
| 20 | $V_{CC}$ | positive supply voltage |

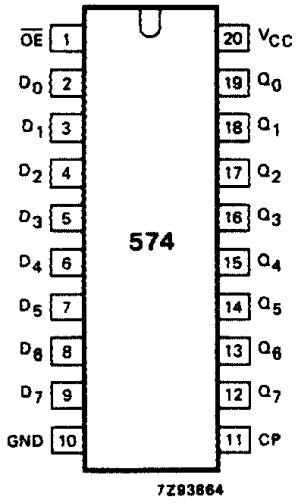



Fig.1 Pin configuration.

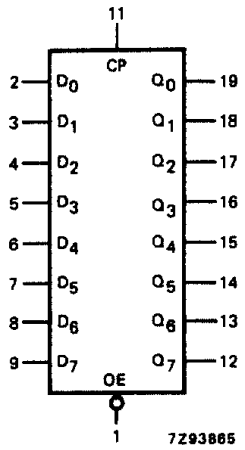



Fig.2 Logic symbol.

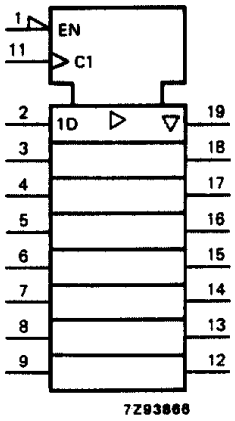



Fig.3 IEC logic symbol.

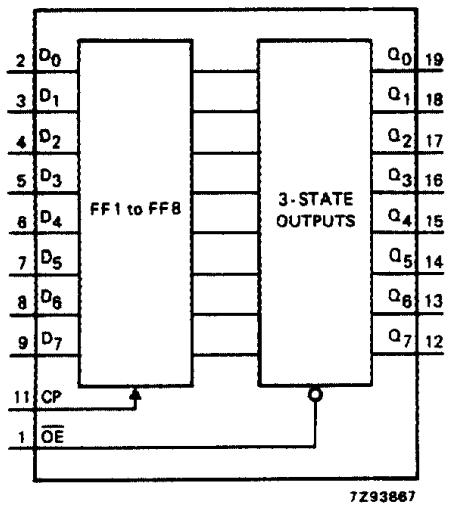



Fig.4 Functional diagram.

**FUNCTION TABLE**

| OPERATING MODES | INPUTS | | | INTERNAL FLIP-FLOPS | OUTPUTS |
|---|---|---|---|---|---|
| | $\overline{OE}$ | CP | $D_n$ | | $Q_0$ to $Q_7$ |
| load and read register | L<br>L | ↑<br>↑ | l<br>h | L<br>H | L<br>H |
| load register and disable outputs | H<br>H | ↑<br>↑ | l<br>h | L<br>H | Z<br>Z |

**Notes**

1. H = HIGH voltage level
   h = HIGH voltage level one set-up time prior to the LOW-to-HIGH CP transition
   L = LOW voltage level
   l = LOW voltage level on set-up time prior to the LOW-to-HIGH CP transition
   Z = HIGH impedance OFF-state
   ↑ = LOW-to-HIGH clock transition

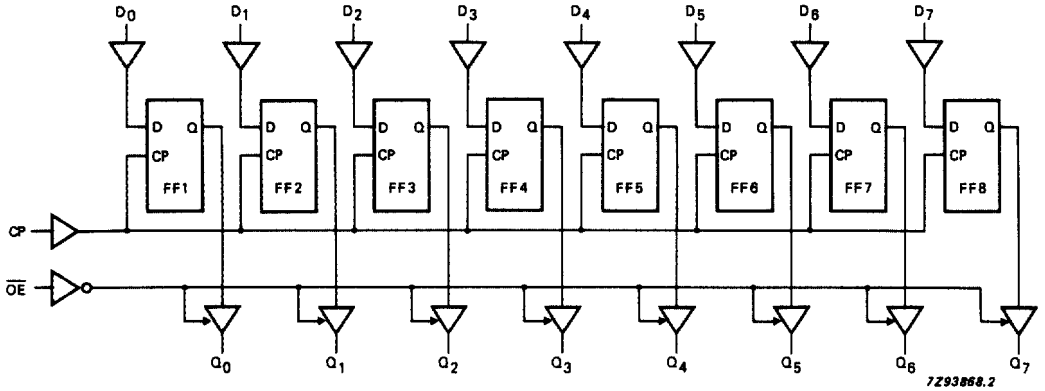



Fig.5 Logic diagram.

### DC CHARACTERISTICS FOR 74HC

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: bus driver
$I_{CC}$ category: MSI

### AC CHARACTERISTICS FOR 74HC

GND = 0 V; $t_r = t_f$ = 6 ns; $C_L$ = 50 pF

| SYMBOL | PARAMETER | $T_{amb}$ (°C) | | | | | | | UNIT | TEST CONDITIONS | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 74HC | | | | | | | | $V_{CC}$ (V) | WAVEFORMS |
| | | +25 | | | −40 to +85 | | −40 to +125 | | | | |
| | | min. | typ. | max. | min. | max. | min. | max. | | | |
| $t_{PHL}/ t_{PLH}$ | propagation delay CP to $Q_n$ | | 47<br>17<br>14 | 150<br>30<br>26 | | 190<br>35<br>33 | | 225<br>45<br>38 | ns | 2.0<br>4.5<br>6.0 | Fig.6 |
| $t_{PZH}/ t_{PZL}$ | 3-state output enable time $\overline{OE}$ to $Q_n$ | | 44<br>16<br>13 | 140<br>28<br>24 | | 175<br>35<br>30 | | 210<br>42<br>36 | ns | 2.0<br>4.5<br>6.0 | Fig.7 |
| $t_{PHZ}/ t_{PLZ}$ | 3-state output disable time $\overline{OE}$ to $Q_n$ | | 39<br>14<br>11 | 125<br>25<br>21 | | 155<br>31<br>26 | | 190<br>38<br>32 | ns | 2.0<br>4.5<br>6.0 | Fig.7 |
| $t_{THL}/ t_{TLH}$ | output transition time | | 14<br>5<br>4 | 60<br>12<br>10 | | 75<br>15<br>13 | | 90<br>18<br>15 | ns | 2.0<br>4.5<br>6.0 | Fig.6 |
| $t_W$ | clock pulse width HIGH or LOW | 80<br>16<br>14 | 14<br>5<br>4 | | 100<br>20<br>17 | | 120<br>24<br>20 | | ns | 2.0<br>4.5<br>6.0 | Fig.6 |
| $t_{su}$ | set-up time $D_n$ to CP | 60<br>12<br>10 | 6<br>2<br>2 | | 75<br>15<br>13 | | 90<br>18<br>15 | | ns | 2.0<br>4.5<br>6.0 | Fig.8 |
| $t_h$ | hold time $D_n$ to CP | 5<br>5<br>5 | 0<br>0<br>0 | | 5<br>5<br>5 | | 5<br>5<br>5 | | ns | 2.0<br>4.5<br>6.0 | Fig.8 |
| $f_{max}$ | maximum clock pulse frequency | 6.0<br>30<br>35 | 37<br>112<br>133 | | 4.8<br>24<br>28 | | 4.0<br>20<br>24 | | MHz | 2.0<br>4.5<br>6.0 | Fig.6 |

### DC CHARACTERISTICS FOR 74HCT

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: bus driver
$I_{CC}$ category: MSI

### Note to HCT types

The value of additional quiescent supply current ($\Delta I_{CC}$) for a unit load of 1 is given in the family specifications. To determine $\Delta I_{CC}$ per input, multiply this value by the unit load coefficient shown in the table below.

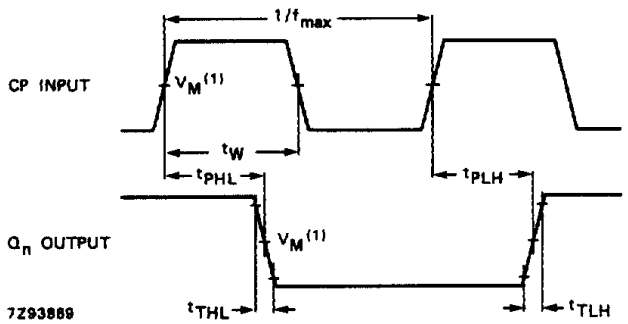
| INPUT | UNIT LOAD COEFFICIENT |
|---|---|
| $D_n$ | 0.5 |
| $\overline{OE}$ | 1.25 |
| CP | 1.5 |

### AC CHARACTERISTICS FOR 74HCT

GND = 0 V; $t_r = t_f$ = 6 ns; $C_L$ = 50 pF

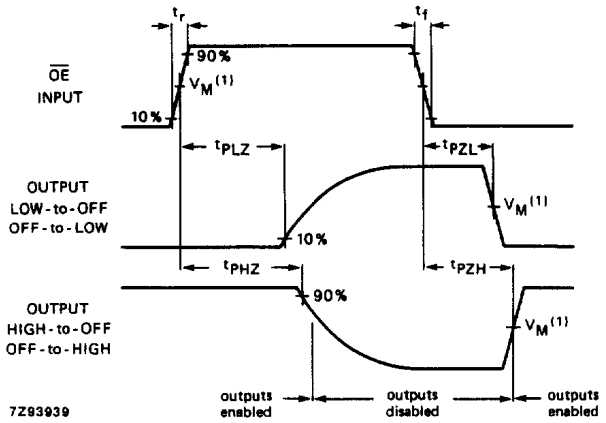
| SYMBOL | PARAMETER | $T_{amb}$ (°C) | | | | | | | UNIT | TEST CONDITIONS | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 74HCT | | | | | | | | $V_{CC}$ (V) | WAVEFORMS |
| | | +25 | | | −40 to +85 | | −40 to +125 | | | | |
| | | min. | typ. | max. | min. | max. | min. | max. | | | |
| $t_{PHL}/ t_{PLH}$ | propagation delay CP to $Q_n$ | | 18 | 33 | | 41 | | 50 | ns | 4.5 | Fig.6 |
| $t_{PZH}/ t_{PZL}$ | 3-state output enable time $\overline{OE}$ to $Q_n$ | | 19 | 33 | | 41 | | 50 | ns | 4.5 | Fig.7 |
| $t_{PHZ}/ t_{PLZ}$ | 3-state output disable time $\overline{OE}$ to $Q_n$ | | 16 | 28 | | 35 | | 42 | ns | 4.5 | Fig.7 |
| $t_{THL}/ t_{TLH}$ | output transition time | | 5 | 12 | | 15 | | 18 | ns | 4.5 | Fig.6 |
| $t_W$ | clock pulse width HIGH or LOW | 16 | 7 | | 20 | | 24 | | ns | 4.5 | Fig.6 |
| $t_{su}$ | set-up time $D_n$ to CP | 12 | 3 | | 15 | | 18 | | ns | 4.5 | Fig.8 |
| $t_h$ | hold time $D_n$ to CP | 5 | −1 | | 5 | | 5 | | ns | 4.5 | Fig.8 |
| $f_{max}$ | maximum clock pulse frequency | 30 | 69 | | 24 | | 20 | | MHz | 4.5 | Fig.6 |

## AC WAVEFORMS



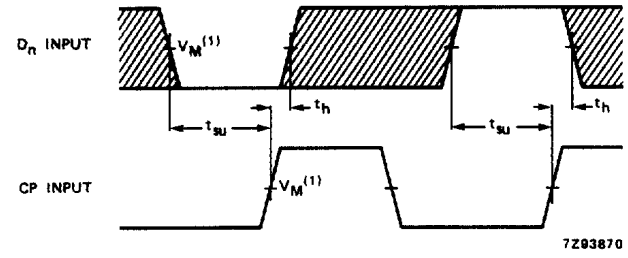

(1) HC : $V_M$ = 50%; $V_I$ = GND to $V_{CC}$.
HCT: $V_M$ = 1.3 V; $V_I$ = GND to 3 V.

Fig.6 Waveforms showing the clock input (CP) pulse width, the CP input to output ($Q_n$) propagation delays, the output transition times and the maximum clock pulse frequency.




(1) HC : $V_M$ = 50%; $V_I$ = GND to $V_{CC}$.
HCT: $V_M$ = 1.3 V; $V_I$ = GND to 3 V.

Fig.7 Waveforms showing the 3-state enable and disable times.




The shaded areas indicate when the input is permitted to change for predictable output performance.

(1) HC : $V_M$ = 50%; $V_I$ = GND to $V_{CC}$.
HCT: $V_M$ = 1.3 V; $V_I$ = GND to 3 V.

Fig.8 Waveforms showing the data set-up and hold times for $D_n$ input to CP input.

## PACKAGE OUTLINES

See *"74HC/HCT/HCU/HCMOS Logic Package Outlines"*.

# OCEAN CHIPS
## Океан Электроники
## Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

**«JONHON»** (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

**«FORSTAR»** (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

FORSTAR®

Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А