HD74AC374/HD74ACT374

Octal D-Type Flip-Flops with 3-State Output

HITACHI

ADE-205-395 (Z)
1st. Edition
Sep. 2000

Description

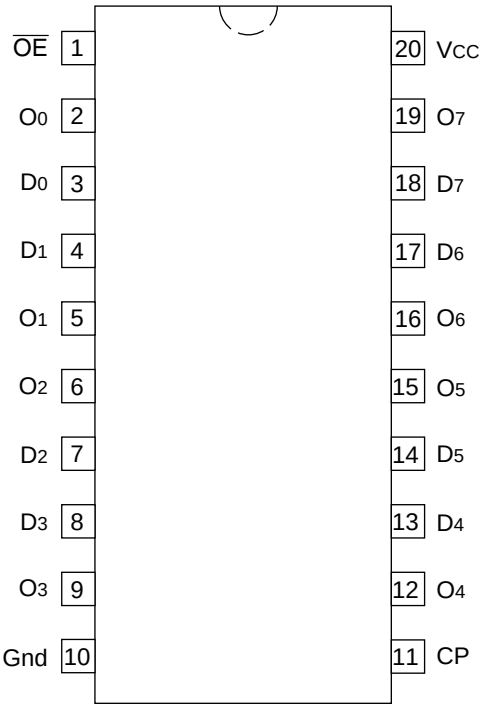
The HD74AC374/HD74ACT374 is a high-speed, low-power octal D-type flip-flop featuring separate D-type inputs for each flip-flop and 3-state outputs for bus-oriented applications. A buffered Clock (CP) and Output Enable ($\overline{OE}$) are common to all flip-flops.

Features

- Buffered Positive Edge-Triggered Clock
- 3-State Outputs for Bus-Oriented Applications
- Outputs Source/Sink 24 mA
- See HD74AC273/HD74ACT273 for Reset Version
- See HD74AC373/HD74ACT373 for Transparent Latch Version
- See HD74AC574/HD74ACT574 for Broadside Pinout Version
- See HD74AC564/HD74ACT564 for Broadside
- Pinout Version with Inverted Outputs
- HD74ACT374 has TTL-Compatible Inputs

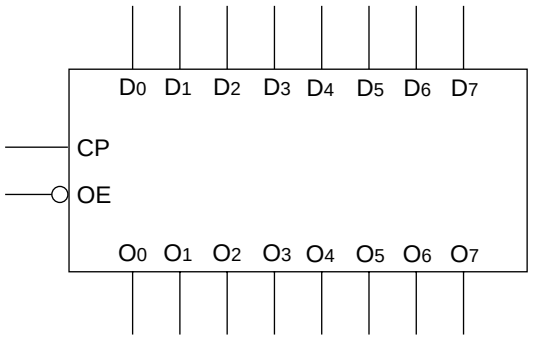
Hitachi semiconductor

Pin Arrangement



(Top view)

Logic Symbol



Pin Names

$D_0 – D_7$	Data Inputs
CP	Clock Pulse Input
$\overline{OE}$	3-State Output Enable Input
$O_0 – O_7$	3-State Outputs

Functional Description

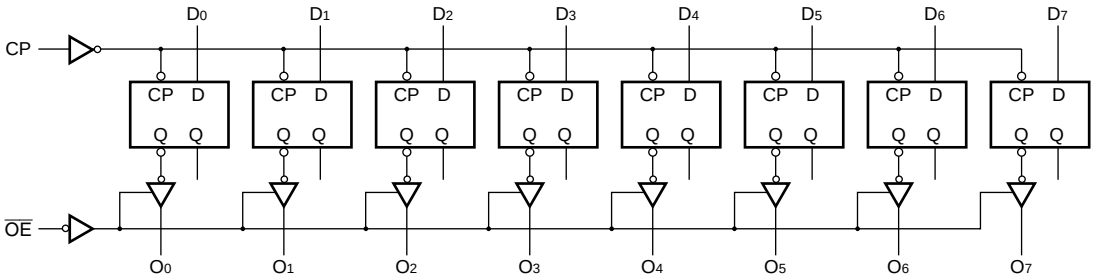
The HD74AC374/HD74ACT374 consists of eight edge-triggered flip-flops with individual D-type inputs and 3-state true outputs. The buffered clock and buffered Output Enable are common to all flip-flops. The eight flip-flops will store the state of their individual D inputs that meet the setup and hold time requirements on the Low-to-High Clock (CP) transition. With the Output Enable ($\overline{OE}$) Low, the contents of the eight flip-flops are available at the outputs. When the $\overline{OE}$ is High, the outputs go to the high impedance state. Operation of the $\overline{OE}$ input does not affect the state of the flip-flops.

Truth Table

Inputs			Outputs
D_n	CP	$\overline{OE}$	O_n
H	↑	L	H
L	↑	L	L
X	X	H	Z

H : High Voltage Level
L : Low Voltage Level
X : Immaterial
Z : High Impedance
↑ : Low-to-High Transition

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

DC Characteristics (unless otherwise specified)

Item	Symbol	Max	Unit	Condition
Maximum quiescent supply current	I_{CC}	80	µA	V_{IN} = V_{CC} or ground, V_{CC} = 5.5 V, Ta = Worst case
Maximum quiescent supply current	I_{CC}	8.0	µA	V_{IN} = V_{CC} or ground, V_{CC} = 5.5 V, Ta = 25°C
Maximum I_{CC}/input (HD74ACT374)	I_{CCT}	1.5	mA	V_{IN} = V_{CC} – 2.1 V, V_{CC} = 5.5 V, Ta = Worst case

AC Characteristics: HD74AC374

			Ta = +25°C C_L = 50 pF			Ta = –40°C to +85°C C_L = 50 pF		
Item	**Symbol**	**V_{CC} (V)*[1]**	**Min**	**Typ**	**Max**	**Min**	**Max**	**Unit**
Maximum clock	f_{max}	3.3	60	110	—	60	—	MHz
frequency		5.0	100	155	—	100	—	
Propagation delay	t_{PLH}	3.3	1.0	11.0	13.5	1.0	15.5	ns
CP to O_n		5.0	1.0	8.0	9.5	1.0	10.5	
Propagation delay	t_{PHL}	3.3	1.0	10.0	12.5	1.0	14.0	ns
CP to O_n		5.0	1.0	7.0	9.0	1.0	10.0	
Output enable time	t_{ZH}	3.3	1.0	9.5	11.5	1.0	13.0	ns
		5.0	1.0	7.0	8.5	1.0	9.5	
Output enable time	t_{ZL}	3.3	1.0	9.0	11.5	1.0	13.0	ns
		5.0	1.0	6.5	8.5	1.0	9.5	
Output disable time	t_{HZ}	3.3	1.0	10.5	12.5	1.0	14.5	ns
		5.0	1.0	8.0	11.0	1.0	12.5	
Output disable time	t_{LZ}	3.3	1.0	8.0	11.5	1.0	12.5	ns
		5.0	1.0	6.5	8.5	1.0	10.0	

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

AC Operating Requirements: HD74AC374

Item	Symbol	V_{CC} (V)*[1]	Ta = +25°C C_L = 50 pF	Ta = –40°C to +85°C C_L = 50 pF		Unit
			Typ	Guaranteed Minimum		
Setup time, HIGH or LOW	t_{su}	3.3	2.0	5.5	6.5	ns
D_n to CP		5.0	1.0	4.0	4.5	
Hold time, HIGH or LOW	t_h	3.3	–1.0	1.0	1.0	ns
D_n to CP		5.0	–4.0	1.5	1.5	
CP pulse width, HIGH or LOW	t_w	3.3	4.0	5.5	6.0	ns
		5.0	2.5	4.0	4.5	

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

AC Characteristics: HD74ACT374

Item	Symbol	V_{CC} (V)*[1]	Ta = +25°C C_L = 50 pF			Ta = –40°C to +85°C C_L = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Maximum clock frequency	f_{max}	5.0	100	160	—	90	—	MHz
Propagation delay CP to O_n	t_{PLH}	5.0	1.0	8.5	10.0	1.0	11.5	ns
Propagation delay CP to O_n	t_{PHL}	5.0	1.0	8.0	9.5	1.0	11.0	ns
Output enable time	t_{ZH}	5.0	1.0	8.0	9.5	1.0	10.5	ns
Output enable time	t_{ZL}	5.0	1.0	8.0	9.0	1.0	10.5	ns
Output disable time	t_{HZ}	5.0	1.0	8.5	11.5	1.0	12.5	ns
Output disable time	t_{LZ}	5.0	1.0	7.0	8.5	1.0	10.0	ns

Note: 1. Voltage Range 5.0 is 5.0 V ± 0.5 V

AC Operating Requirements: HD74ACT374

Item	Symbol	V_{CC} (V)*[1]	Ta = +25°C, C_L = 50 pF	Ta = –40°C to +85°C, C_L = 50 pF		Unit
			Typ	Guaranteed Minimum		
Setup time, HIGH or LOW D_n to CP	t_{su}	5.0	1.0	7.0	5.5	ns
Hold time, HIGH or LOW D_n to CP	t_h	5.0	0.0	1.5	1.5	ns
CP pulse width, HIGH or LOW	t_w	5.0	2.0	7.0	5.0	ns

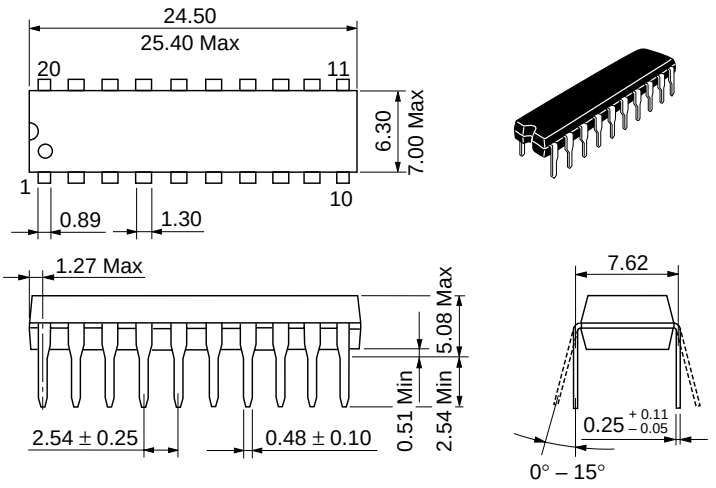
Note: 1. Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	C_{IN}	4.5	pF	V_{CC} = 5.5 V
Power dissipation capacitance	C_{PD}	80.0	pF	V_{CC} = 5.0 V

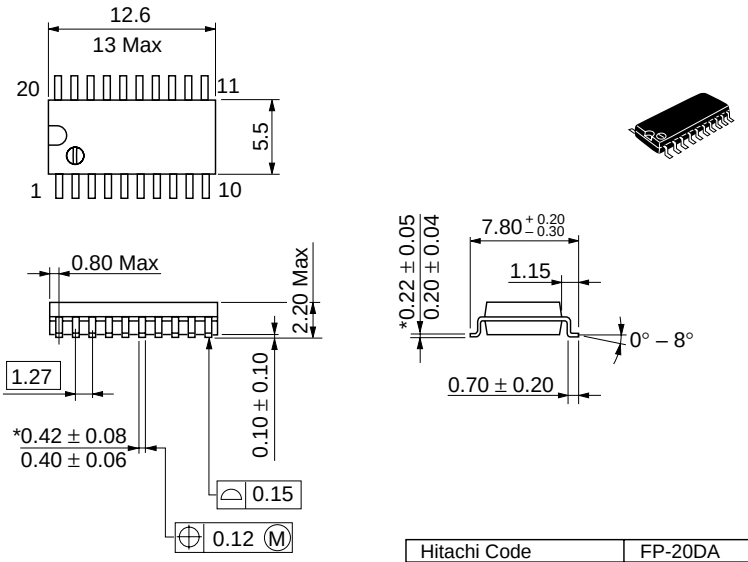
Package Dimensions

Unit: mm



Hitachi Code	DP-20N
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.26 g

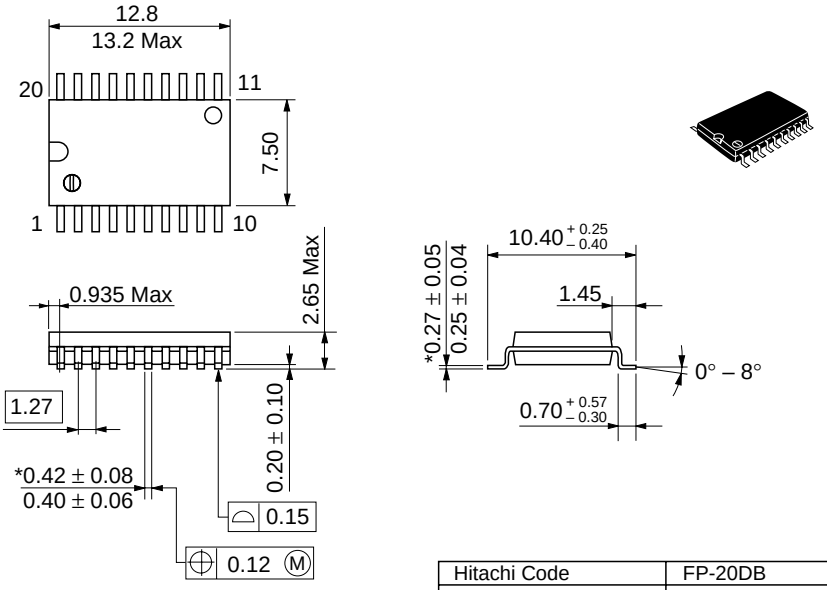
Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-20DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.31 g

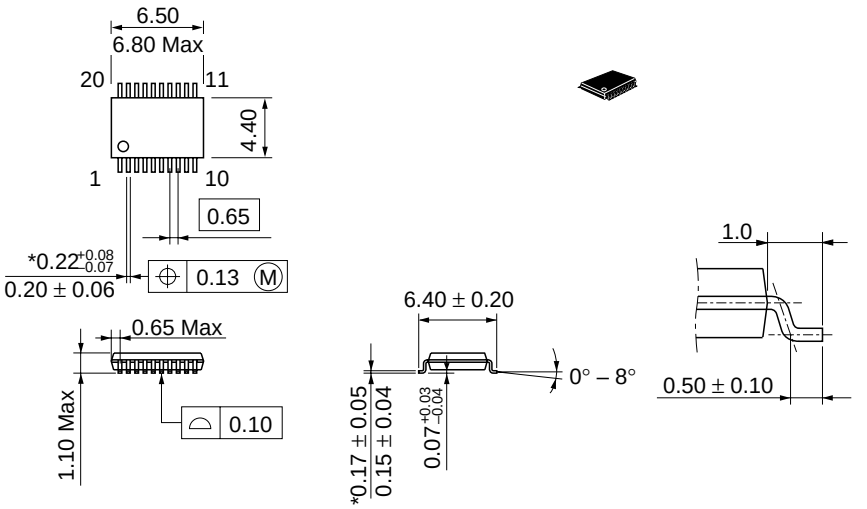
Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-20DB
JEDEC	Conforms
EIAJ	—
Mass (reference value)	0.52 g

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-20DA
JEDEC	—
EIAJ	—
Mass (reference value)	0.07 g

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HITACHI

Hitachi, Ltd.
Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL
NorthAmerica : http://semiconductor.hitachi.com/
Europe : http://www.hitachi-eu.com/hel/ecg
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For further information write to:

Hitachi Semiconductor (America) Inc.
179 East Tasman Drive,
San Jose,CA 95134
Tel: <1> (408) 433-1990
Fax: <1>(408) 433-0223

Hitachi Europe GmbH
Electronic Components Group
Dornacher Straβe 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 585160

Hitachi Asia Ltd.
Hitachi Tower
16 Collyer Quay #20-00,
Singapore 049318
Tel : <65>-538-6533/538-8577
Fax : <65>-538-6933/538-3877
URL : http://www.hitachi.com.sg

Hitachi Asia Ltd.
(Taipei Branch Office)
4/F, No. 167, Tun Hwa North Road,
Hung-Kuo Building,
Taipei (105), Taiwan
Tel : <886>-(2)-2718-3666
Fax : <886>-(2)-2718-8180
Telex : 23222 HAS-TP
URL : http://www.hitachi.com.tw

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower,
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon,
Hong Kong
Tel : <852>-(2)-735-9218
Fax : <852>-(2)-730-0281
URL : http://www.hitachi.com.hk

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