

HD74LS273 (with Clear) ●Octal D-type Positive-edge-triggered Flip-Flops

The HD74LS273, positive-edge-triggered flip-flops utilize LS TTL circuitry to implement D-type flip-flop logic with a direct clear input.

Information at the D inputs meeting the setup time requirements is transferred to the Q outputs on the positive-going edge of the clock pulse.

Clock triggering occurs at a particular voltage level and is not directly related to the transition time of the positive-going pulse.

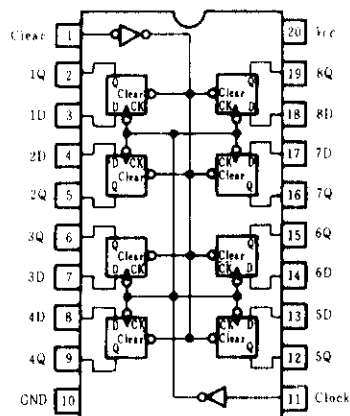
When the clock input is at either the high or low level, the D input signal has no effect at the output.

FUNCTION TABLE

Inputs			Output
Clear	Clock	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q_0

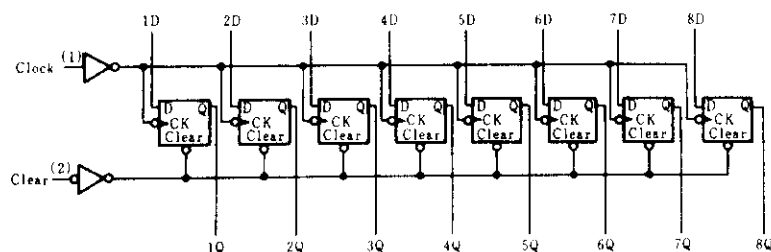
Notes; H = high level, L = low level,
X = irrelevant
↑ = transition from low to high level
 Q_0 = level of Q before the indicated steady-state input conditions were established.

PIN ARRANGEMENT



(Top View)

BLOCK DIAGRAM



RECOMMENDED OPERATING CONDITIONS

Item	Symbol	min	typ	max	Unit
Supply voltage	V_{CC}	4.75	5.00	5.25	V
Output current	I_{OH}	—	—	-400	μA
	I_{OL}	—	—	8	mA
Clock frequency	f_{clock}	0	—	30	MHz
Clock and clear pulse width	t_w	20	—	—	ns
Setup time	Data	20 ↑	—	—	ns
	Clear inactive-state	25 ↑	—	—	
Data hold time	t_h	5 ↑	—	—	ns

Note) ↑ : The arrow indicates the rising edge of clock pulse.

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$)

Item	Symbol	Test Conditions	min	typ*	max	Unit
Input voltage	V_{IH}		2.0	—	—	V
	V_{IL}		—	—	0.8	V
Output voltage	V_{OH}	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$, $I_{OH}=-400\mu\text{A}$	2.7	—	—	V
	V_{OL}	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $I_{OL}=8\text{mA}$	—	—	0.5	V
		$V_{IL}=0.8\text{V}$, $I_{OL}=4\text{mA}$	—	—	0.4	
Input current	I_I	$V_{CC}=5.25\text{V}$, $V_I=7\text{V}$	—	—	0.1	mA
	I_{IH}	$V_{CC}=5.25\text{V}$, $V_I=2.7\text{V}$	—	—	20	μA
	I_{IL}	$V_{CC}=5.25\text{V}$, $V_I=0.4\text{V}$	—	—	-0.4	mA
Short-circuit output current	I_{OS}	$V_{CC}=5.25\text{V}$	-20	—	-100	mA
Supply current	I_{CC}^{**}	$V_{CC}=5.25\text{V}$	—	17	27	mA
Input clamp voltage	V_{IK}	$V_{CC}=4.75\text{V}$, $I_{IN}=-18\text{mA}$	—	—	-1.5	V

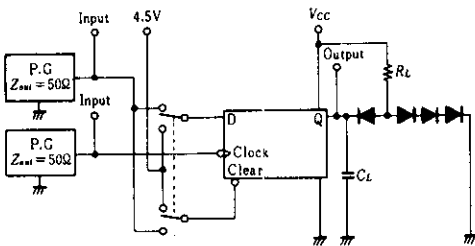
* $V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$

** : With all outputs open and 4.5V applied to all data and clear inputs, I_{CC} is measured after a momentary ground, then 4.5V is applied to clock.

SWITCHING CHARACTERISTICS ($V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$)

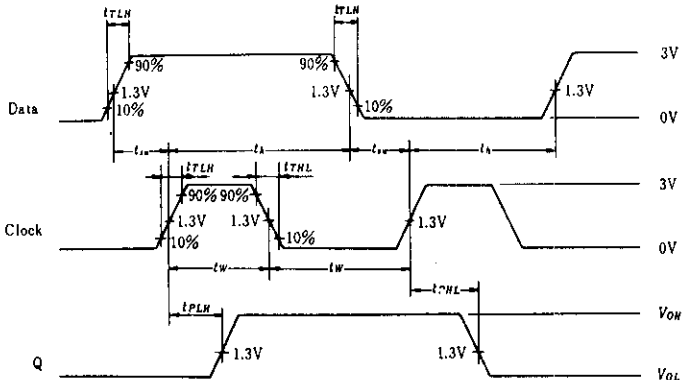
Item	Symbol	Inputs	Test Conditions	min	typ	max	Unit
Maximum clock frequency	f_{max}	Clock	$C_L=15\text{pF}, R_L=2\text{k}\Omega$	30	—	—	MHz
Propagation Delay Time	t_{PHL}	Clear		—	18	27	ns
	t_{PLH}	Clock		—	17	27	
	t_{PHL}			—	18	27	

TESTING METHOD



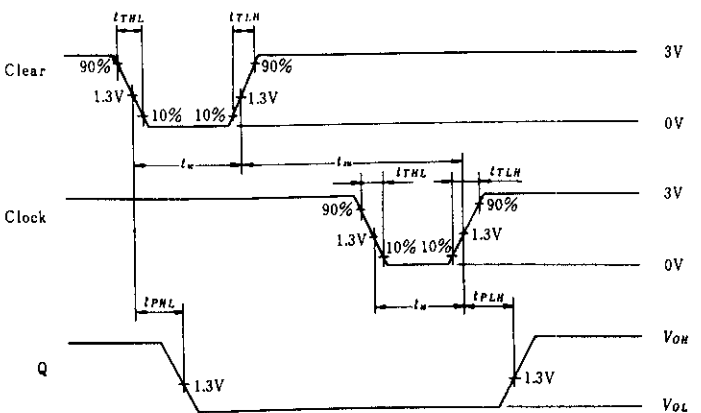
- Notes:
- C_L includes probe and jig capacitance.
 - All diodes are 1S2074 $\oplus$.

Waveform-1

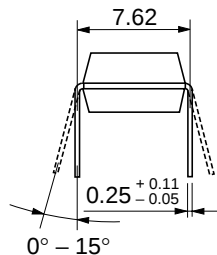
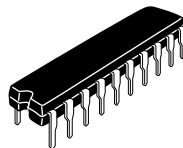
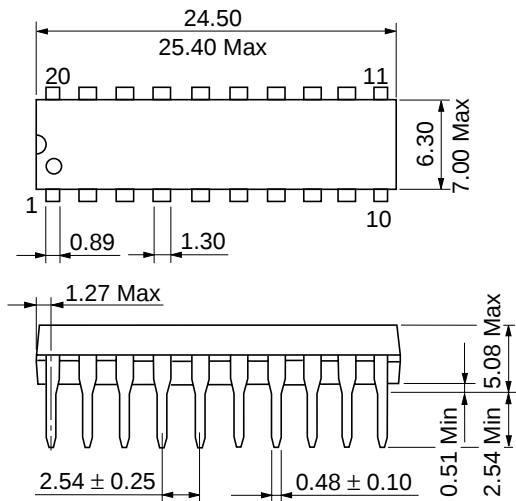


- Notes:
- Input pulse; $t_{TLH} \leq 15\text{ns}$, $t_{THL} \leq 6\text{ns}$
Clock input; $\text{PRR} = 1\text{MHz}$, duty cycle 50%
Data input; $\text{PRR} = 500\text{kHz}$, duty cycle 50%

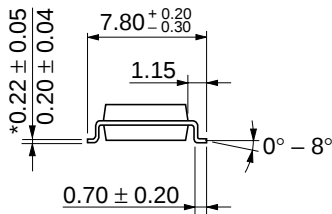
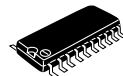
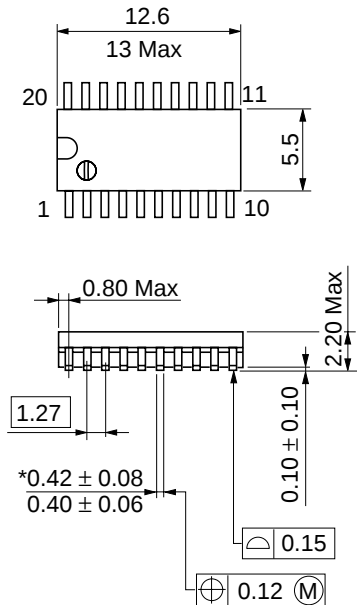
Waveform-2



- Note: Input pulse; $t_{TLH} \leq 15\text{ns}$, $t_{THL} \leq 6\text{ns}$, $\text{PRR} = 1\text{MHz}$.



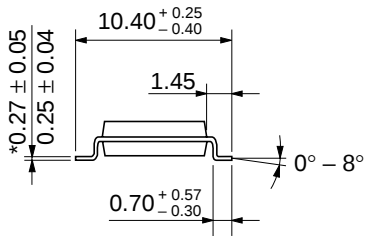
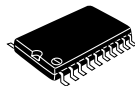
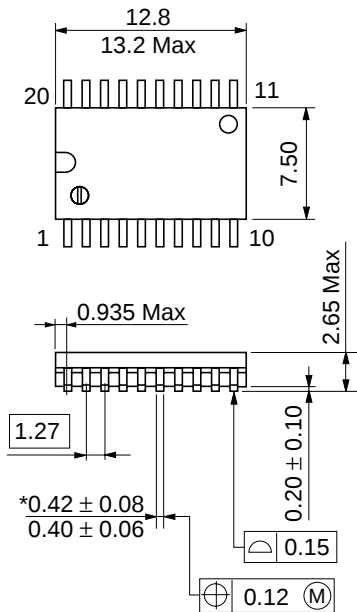
Hitachi Code	DP-20N
JEDEC	—
EIAJ	Conforms
Weight (reference value)	1.26 g



*Dimension including the plating thickness
Base material dimension

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

Unit: mm



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

$$\frac{\text{*Dimension including the plating thickness}}{\text{Base material dimension}}$$

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

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
	Asia (Singapore)	:	http://www.has.hitachi.com.sg/grp3/sicd/index.htm
	Asia (Taiwan)	:	http://www.hitachi.com.tw/E/Product/SICD_Frame.htm
	Asia (HongKong)	:	http://www.hitachi.com.hk/eng/bo/grp3/index.htm
	Japan	:	http://www.hitachi.co.jp/Sicd/indx.htm

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 Straße 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) 778322
--	---

Hitachi Asia Pte. Ltd. 16 Collyer Quay #20-00 Hitachi Tower Singapore 049318 Tel: 535-2100 Fax: 535-1533 Hitachi Asia Ltd. Taipei Branch Office 3F, Hung Kuo Building, No.167, Tun-Hwa North Road, Taipei (105) Tel: <886> (2) 2718-3666 Fax: <886> (2) 2718-8180
--

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 Telex: 40815 HITEC HX
--

Copyright ' Hitachi, Ltd., 1999. All rights reserved. Printed in Japan.