
HD74LVC534

Octal D-type Flip Flops with 3-state Outputs

HITACHI

ADE-205-071B(Z)

Rev.2

September 1995

Description

The HD74LVC534 has eight edge trigger D type flip flops with three state outputs in a 20 pin package. Data at the D inputs meeting set up requirements, are transferred to the Q outputs on positive going transitions of the clock input. When the latch enable goes low, data at the D inputs will be retained at the outputs until latch enable returns high again. When a high logic level is applied to the output control input, all outputs go to a high impedance state, regardless of what signals are present at the other inputs and the state of the storage elements. Low voltage and high speed operation is suitable at the battery drive product (note type personal computer) and low power consumption extends the life of a battery for long time operation.

Features

- $V_{cc} = 2.0 \text{ V to } 5.5 \text{ V}$
- All inputs $V_{IH} (\text{Max.}) = 5.5 \text{ V} (@V_{cc} = 0 \text{ V to } 5.5 \text{ V})$
- Typical V_{OL} ground bounce $< 0.8 \text{ V} (@V_{cc} = 3.3 \text{ V}, T_a = 25^\circ\text{C})$
- Typical V_{OH} undershoot $> 2.0 \text{ V} (@V_{cc} = 3.3 \text{ V}, T_a = 25^\circ\text{C})$
- High output current $\pm 24 \text{ mA} (@V_{cc} = 3.0 \text{ V to } 5.5 \text{ V})$

HD74LVC534

Function Table

Inputs			
\bar{G}	CK	D	Output \bar{Q}
H	X	X	Z
L	↑	L	H
L	↑	H	L
L	L	X	Q_0

H : High level

L : Low level

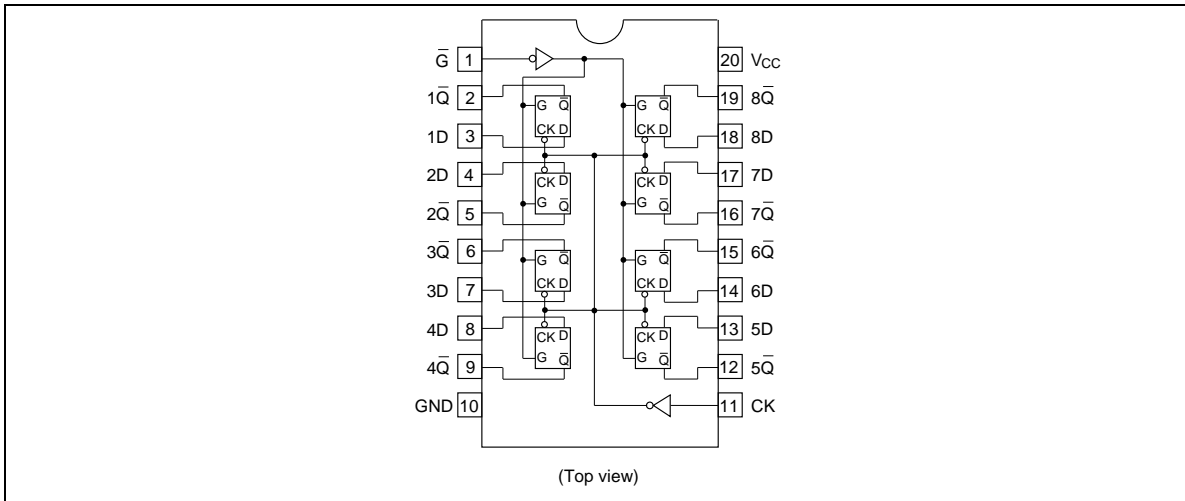
X : Immaterial

Z : High impedance

↑ : Low to high transition

Q_0 : Level of \bar{Q} before the indicated steady input conditions were established.

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	-0.5 to 6.0	V	
Input diode current	I_{IK}	-50	mA	$V_I = -0.5\text{ V}$
Input voltage	V_I	-0.5 to 6.0	V	
Output diode current	I_{OK}	-50	mA	$V_O = -0.5\text{ V}$
		50	mA	$V_O = V_{CC}+0.5\text{ V}$
Output voltage	V_O	-0.5 to $V_{CC} +0.5$	V	
Output current	I_O	± 50	mA	
V_{CC} , GND current / pin	I_{CC} or I_{GND}	100	mA	
Storage temperature	Tstg	-65 to +150	°C	

Note: The absolute maximum ratings are values which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	1.5 to 5.5	V	Data retention
		2.0 to 5.5	V	At operation
Input / output voltage	V_I	0 to 5.5	V	\bar{G} , CK, D
	V_O	0 to V_{CC}	V	\bar{Q}
Operating temperature	Ta	-40 to 85	°C	
Output current	I_{OH}	-12	mA	$V_{CC} = 2.7\text{ V}$
		-24^{2}	mA	$V_{CC} = 3.0\text{ V to }5.5\text{ V}$
	I_{OL}	12	mA	$V_{CC} = 2.7\text{ V}$
		24^{2}	mA	$V_{CC} = 3.0\text{ V to }5.5\text{ V}$
Input rise / fall time ¹	t_r, t_f	10	ns/V	

Notes: 1. This item guarantees maximum limit when one input switches.
 Waveform : Refer to test circuit of switching characteristics.
 2. duty cycle $\leq 50\%$

HD74LVC534

Electrical Characteristics

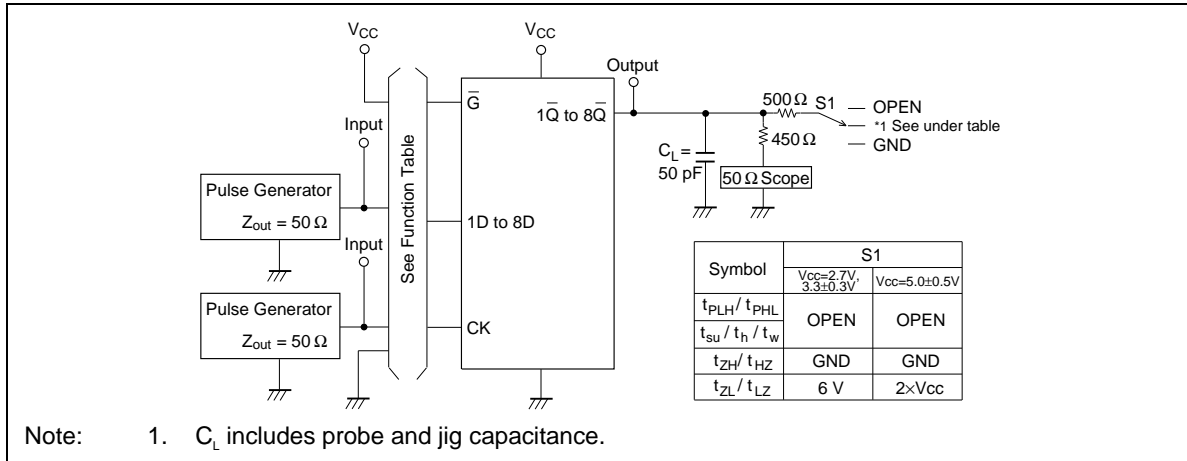
Item	Symbol	V_{CC} (V)	Ta = -40 to 85°C		Unit	Test Conditions	
			Min	Max			
Input voltage	V_{IH}	2.7 to 3.6	2.0	—	V		
		4.5 to 5.5	$V_{CC} \times 0.7$	—	V		
	V_{IL}	2.7 to 3.6	—	0.8	V		
		4.5 to 5.5	—	$V_{CC} \times 0.3$	V		
Output voltage	V_{OH}	2.7 to 5.5	$V_{CC} - 0.2$	—	V	$I_{OH} = -100 \mu A$	
		2.7	2.2	—	V	$I_{OH} = -12 \text{ mA}$	
		3.0	2.4	—	V		
		3.0	2.0	—	V	$I_{OH} = -24 \text{ mA}$	
		4.5	3.8	—	V		
	V_{OL}	2.7 to 5.5	—	0.2	V	$I_{OL} = 100 \mu A$	
		2.7	—	0.4	V	$I_{OL} = 12 \text{ mA}$	
		3.0	—	0.55	V	$I_{OL} = 24 \text{ mA}$	
		4.5	—	0.55	V		
	Input current	I_{IN}	0 to 5.5	—	± 5.0	μA	$V_{IN} = 5.5 \text{ V or GND}$
	Off state output current	I_{OZ}	5.5	—	± 10	μA	$V_{IN} = V_{CC}, \text{ GND}$ $V_{OUT} = V_{CC} \text{ or GND}$
Quiescent supply current	I_{CC}	5.5	—	20	μA	$V_{IN} = V_{CC} \text{ or GND}$	
	ΔI_{CC}	3.0 to 3.6	—	500	μA	$V_{IN} = \text{one input at } (V_{CC} - 0.6) \text{ V,}$ other inputs at $V_{CC} \text{ or GND}$	

Switching Characteristics

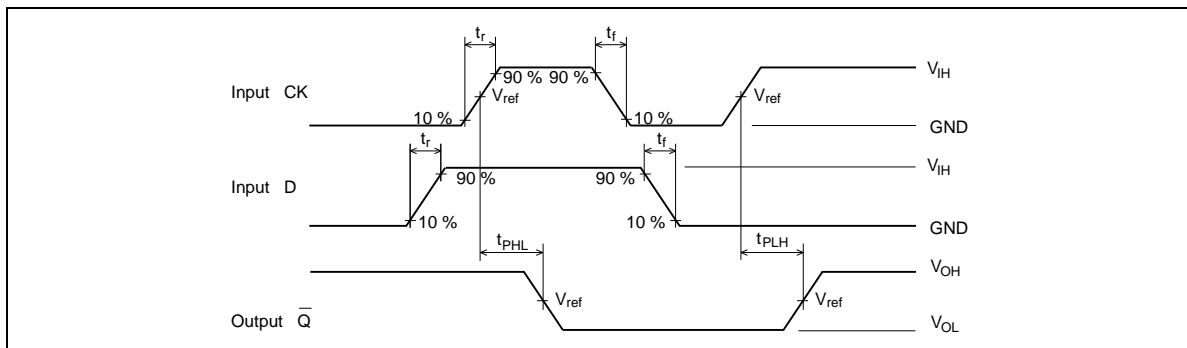
Item	Symbol	V _{CC} (V)	Ta = -40 to 85°C			Unit	From (Input)	To (Output)
			Min	Typ	Max			
Maximum clock frequency	f _{max}	2.7	80.0	—	—	MHz		
		3.3±0.3	100.0	150.0	—	MHz		
		5.0±0.5	125.0	—	—	MHz		
Propagation delay time	t _{PLH}	2.7	—	7.0	9.5	ns	CK	\bar{Q}
		3.3±0.3	1.5	5.5	8.5	ns		
		5.0±0.5	—	4.0	7.0	ns		
Propagation delay time	t _{PHL}	2.7	—	7.0	9.5	ns	CK	\bar{Q}
		3.3±0.3	1.5	5.5	8.5	ns		
		5.0±0.5	—	4.0	7.0	ns		
Output enable time	t _{ZH}	2.7	—	7.0	9.5	ns	\bar{G}	\bar{Q}
		3.3±0.3	1.5	5.5	8.5	ns		
		5.0±0.5	—	4.0	7.0	ns		
Output enable time	t _{ZL}	2.7	—	7.0	9.5	ns	\bar{G}	\bar{Q}
		3.3±0.3	1.5	5.5	8.5	ns		
		5.0±0.5	—	4.0	7.0	ns		
Output disable time	t _{HZ}	2.7	—	5.0	8.5	ns	\bar{G}	\bar{Q}
		3.3±0.3	1.5	4.5	7.5	ns		
		5.0±0.5	—	3.5	6.5	ns		
Setup time	t _{su}	2.7	2.0	—	—	ns		
		3.3±0.3	2.0	—	—	ns		
		5.0±0.5	2.0	—	—	ns		
Hold time	t _h	2.7	1.5	—	—	ns		
		3.3±0.3	1.5	—	—	ns		
		5.0±0.5	1.5	—	—	ns		
Pulse width	t _w	2.7	4.0	—	—	ns		
		3.3±0.3	4.0	—	—	ns		
		5.0±0.5	3.0	—	—	ns		
Input capacitance	C _{IN}	2.7	—	3.0	—	pF		
Output capacitance	C _O	2.7	—	15.0	—	pF		

HD74LVC534

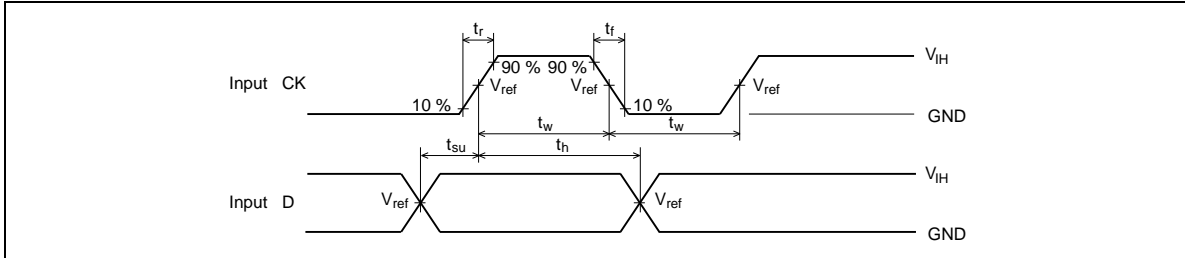
Test Circuit



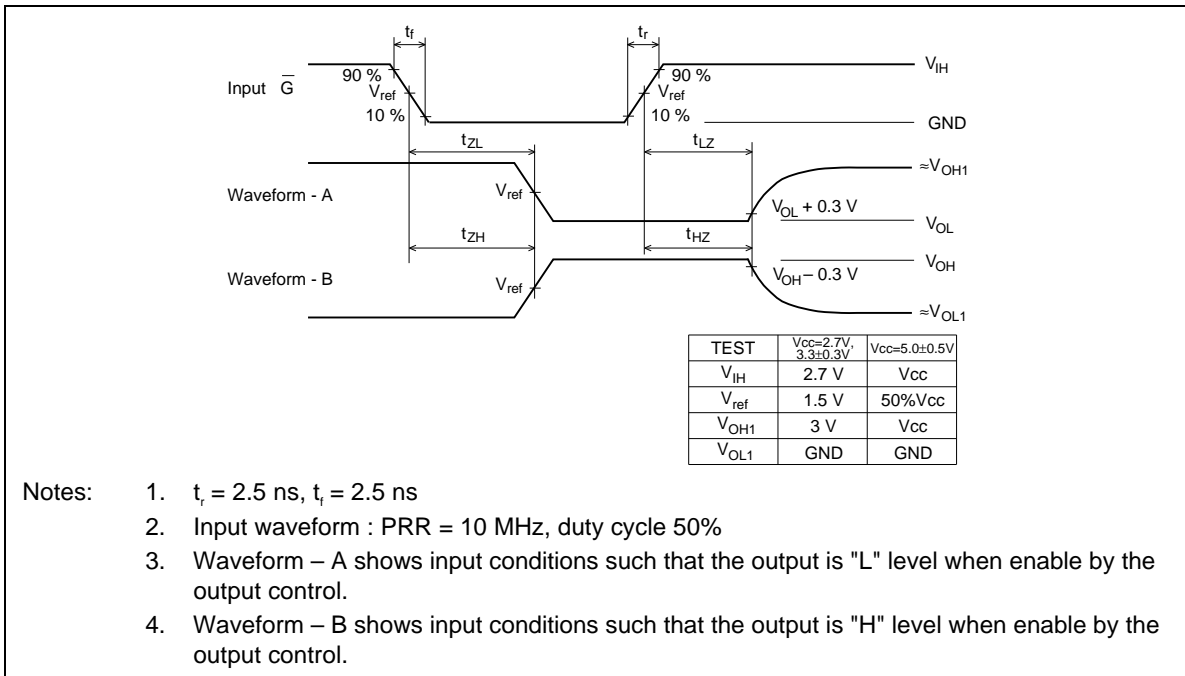
Waveforms – 1



Waveforms – 2



Waveforms – 3



Notice

When using this document, keep the following in mind:

1. This document may, wholly or partially, be subject to change without notice.
2. All rights are reserved: No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without Hitachi's permission.
3. Hitachi will not be held responsible for any damage to the user that may result from accidents or any other reasons during operation of the user's unit according to this document.
4. Circuitry and other examples described herein are meant merely to indicate the characteristics and performance of Hitachi's semiconductor products. Hitachi assumes no responsibility for any intellectual property claims or other problems that may result from applications based on the examples described herein.
5. No license is granted by implication or otherwise under any patents or other rights of any third party or Hitachi, Ltd.
6. **MEDICAL APPLICATIONS:** Hitachi's products are not authorized for use in **MEDICAL APPLICATIONS** without the written consent of the appropriate officer of Hitachi's sales company. Such use includes, but is not limited to, use in life support systems. Buyers of Hitachi's products are requested to notify the relevant Hitachi sales offices when planning to use the products in **MEDICAL APPLICATIONS**.