

# HD74LVC574A

## Octal D-type Flip Flops with 3-state Outputs

REJ03D0361-0400Z  
(Previous ADE-205-117B (Z))  
Rev.4.00  
Jul. 29, 2004

### Description

The HD74LVC574A 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 clock input goes low, data at the D inputs will be retained at the outputs until clock input 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  $V_{IH} (\text{Max.}) = 5.5\text{ V}$  (@  $V_{CC} = 0\text{ V to }5.5\text{ V}$ )
- All outputs  $V_{OUT} (\text{Max.}) = 5.5\text{ V}$  (@  $V_{CC} = 0\text{ V}$  or output off state)
- 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  $\pm 24\text{ mA}$  (@  $V_{CC} = 3.0\text{ V to }5.5\text{ V}$ )
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LVC574AFPEL	SOP-20 pin (JEITA)	FP-20DAV	FP	EL (2,000 pcs/reel)
HD74LVC574ATELL	TSSOP-20 pin	TTP-20DAV	T	ELL (2,000 pcs/reel)

Note: Please consult the sales office for the above package availability.

### Function Table

#### Inputs

$\overline{OC}$	CK	D	Output Q
L	$\uparrow$	H	H
L	$\uparrow$	L	L
L	L	X	$Q_0$
H	X	X	Z

H: High level

L: Low level

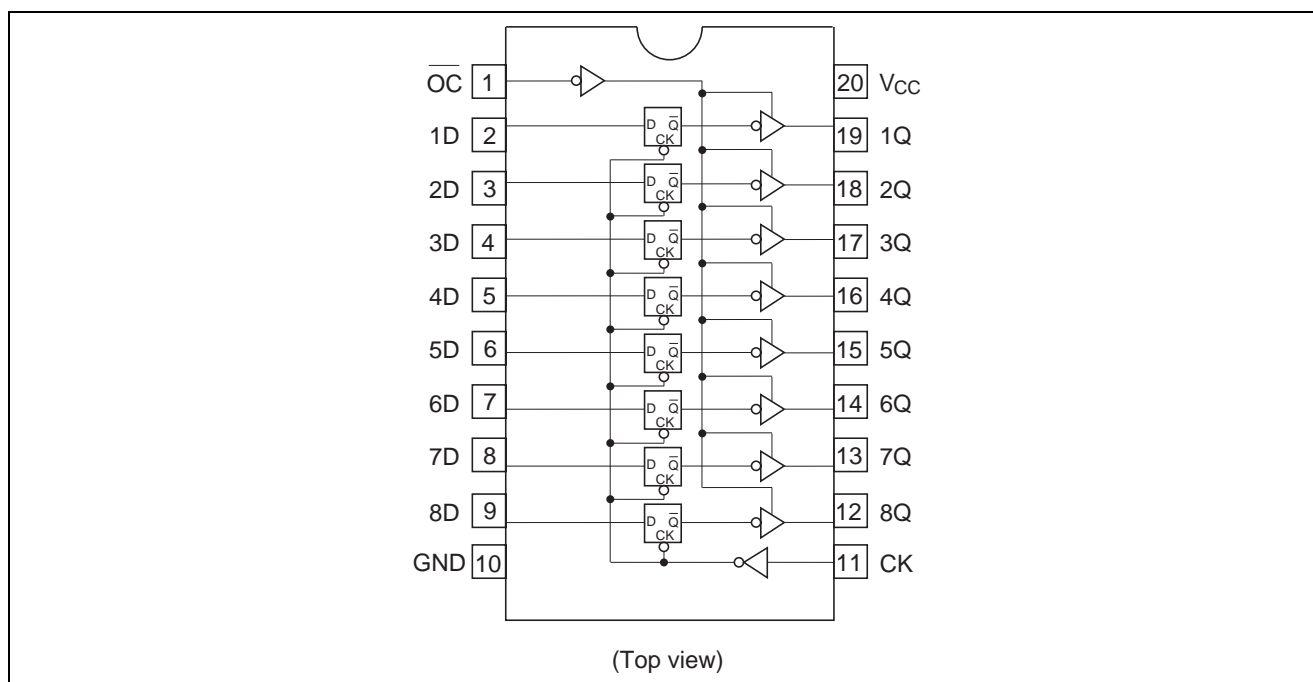
X: Immaterial

Z: High impedance

$\uparrow$ : Low to high transition

$Q_0$ : Level of 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	$V_I = -0.5$ V
Input voltage	$V_I$	-0.5 to 6.0	V	
Output diode current	$I_{OK}$	-50	mA	$V_O = -0.5$ V
		50		$V_O = V_{CC} + 0.5$ V
Output voltage	$V_O$	-0.5 to $V_{CC} + 0.5$	V	Output "H" or "L"
		-0.5 to 6.0		Output "Z" or $V_{CC}$ :OFF
Output current	$I_O$	$\pm 50$	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 hold
		2.0 to 5.5		At operation
Input / output voltage	$V_I$	0 to 5.5	V	$\overline{OC}$ , CK, D
	$V_O$	0 to $V_{CC}$	V	Output "H" or "L"
		0 to 5.5		Output "Z" or $V_{CC}$ :OFF
Operating temperature	$T_a$	-40 to 85	°C	
Output current	$I_{OH}$	-12	mA	$V_{CC} = 2.7\text{ V}$
		-24 <sup>*2</sup>		$V_{CC} = 3.0\text{ V to }5.5\text{ V}$
	$I_{OL}$	12	mA	$V_{CC} = 2.7\text{ V}$
		24 <sup>*2</sup>		$V_{CC} = 3.0\text{ V to }5.5\text{ V}$
Input rise / fall time <sup>*1</sup>	$t_r, t_f$	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  $\leq 50\%$

**Electrical Characteristics**

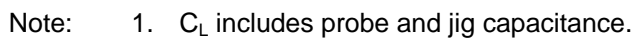
Item	Symbol	$V_{CC}$ (V)	$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit	Test Conditions
			Min	Max		
Input voltage	$V_{IH}$	2.7 to 3.6	2.0	—	V	
		4.5 to 5.5	$V_{CC} \times 0.7$	—		
	$V_{IL}$	2.7 to 3.6	—	0.8	V	
		4.5 to 5.5	—	$V_{CC} \times 0.3$		
Output voltage	$V_{OH}$	2.7 to 5.5	$V_{CC} - 0.2$	—	V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

## Switching Characteristics

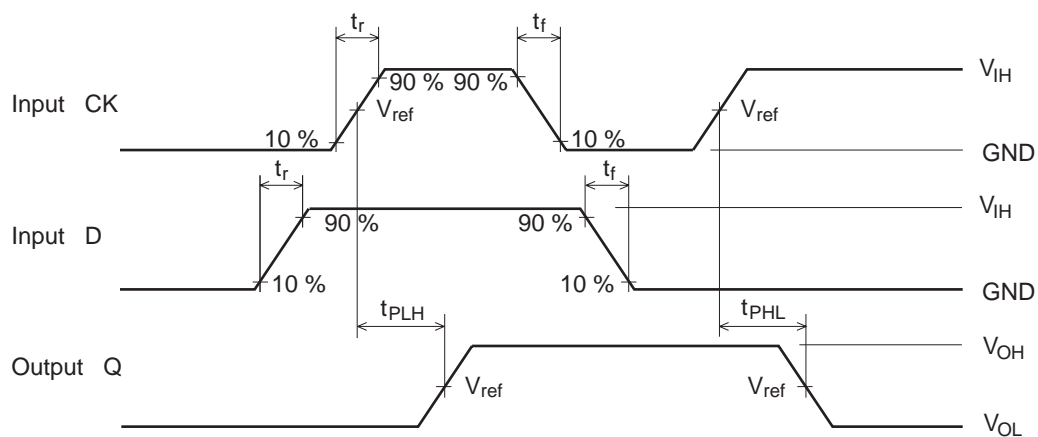
Item	Symbol	V <sub>CC</sub> (V)	Ta = -40 to 85°C			Unit	From (Input)	To (Output)
			Min	Typ	Max			
Maximum clock frequency	f <sub>max</sub>	2.7	80.0	—	—	MHz		
		3.3±0.3	100.0	150.0	—			
		5.0±0.5	125.0	—	—			
Propagation delay time	t <sub>PLH</sub> t <sub>PHL</sub>	2.7	—	—	9.5	ns	CK	Q
		3.3±0.3	1.5	—	8.5			
		5.0±0.5	—	—	7.0			
Output enable time	t <sub>ZH</sub> t <sub>ZL</sub>	2.7	—	—	9.5	ns	$\overline{OC}$	Q
		3.3±0.3	1.5	—	8.5			
		5.0±0.5	—	—	7.0			
Output disable time	t <sub>HZ</sub> t <sub>LZ</sub>	2.7	—	—	8.5	ns	$\overline{OC}$	Q
		3.3±0.3	1.5	—	7.5			
		5.0±0.5	—	—	6.5			
Setup time	t <sub>su</sub>	2.7	2.0	—	—	ns		
		3.3±0.3	2.0	—	—			
		5.0±0.5	2.0	—	—			
Hold time	t <sub>h</sub>	2.7	1.5	—	—	ns		
		3.3±0.3	1.5	—	—			
		5.0±0.5	1.5	—	—			
Pulse width	t <sub>w</sub>	2.7	3.3	—	—	ns		
		3.3±0.3	3.3	—	—			
		5.0±0.5	3.3	—	—			
Between output pins skew <sup>*1</sup>	t <sub>OSLH</sub> t <sub>OSHL</sub>	2.7	—	—	—	ns		
		3.3±0.3	—	—	1.0			
		5.0±0.5	—	—	1.0			
Input capacitance	C <sub>IN</sub>	2.7	—	3.0	—	pF		
Output capacitance	C <sub>O</sub>	2.7	—	15.0	—	pF		

Note: 1. This parameter is characterized but not tested.

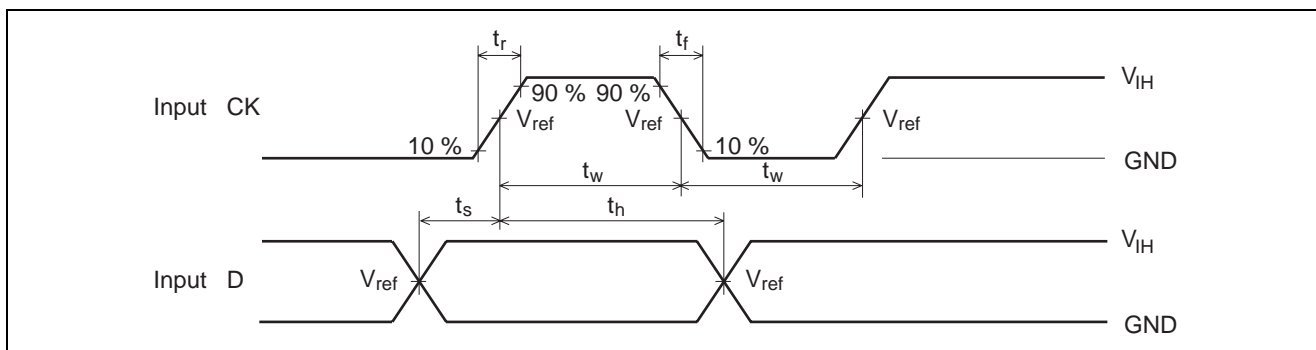
$$t_{OSLH} = |t_{PLHm} - t_{PLHn}|, t_{OSHL} = |t_{PHLm} - t_{PHLn}|$$



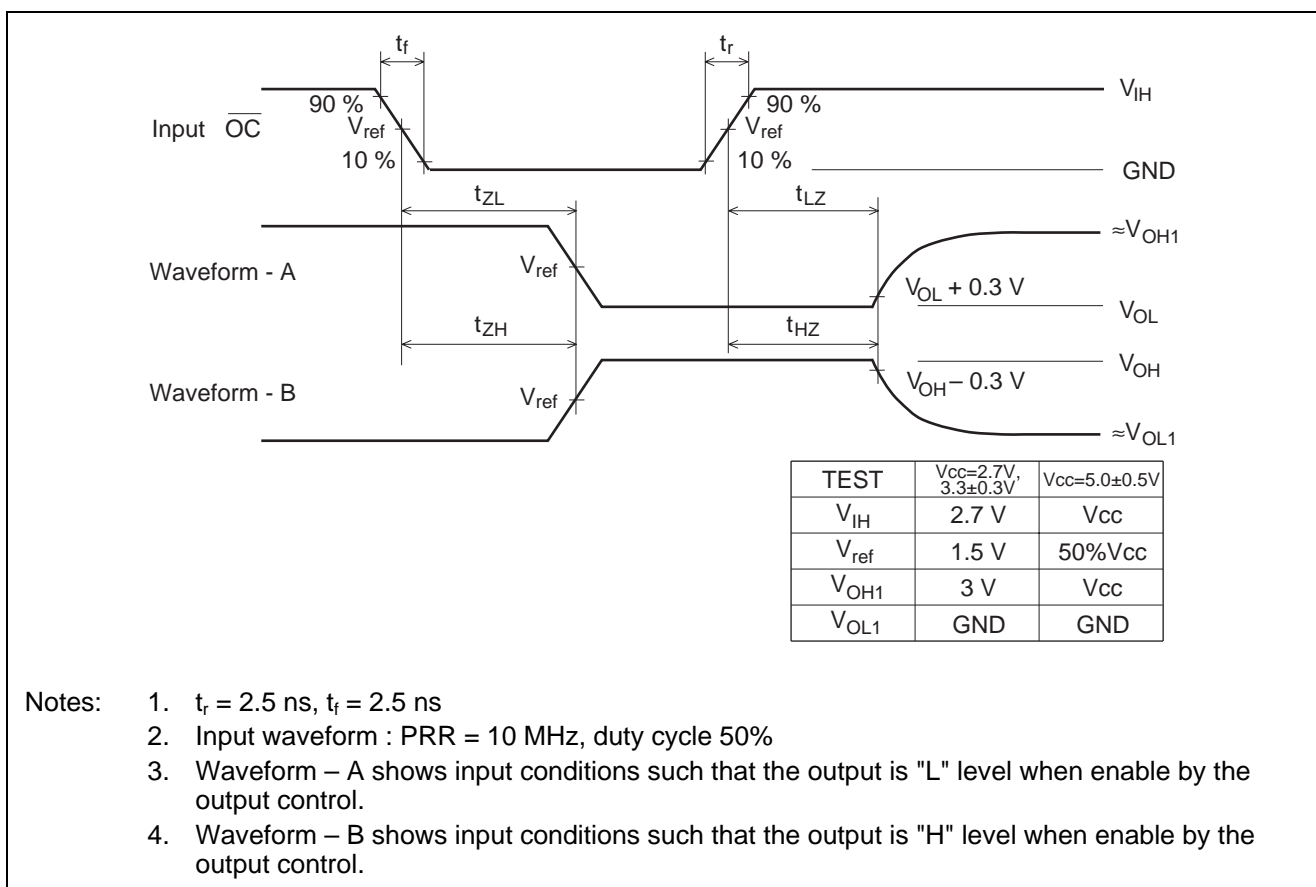
## Waveforms – 1



## Waveforms – 2



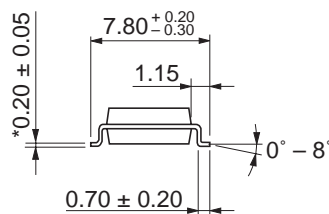
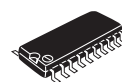
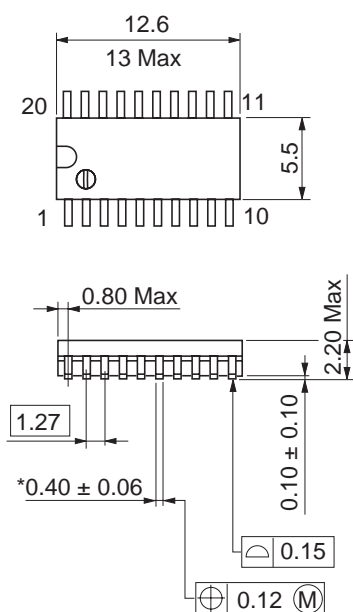
## Waveforms – 3



# Package Dimensions

As of January, 2002

Unit: mm

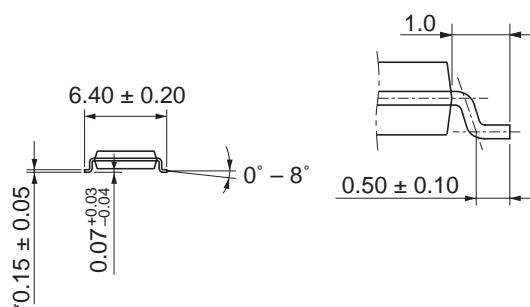
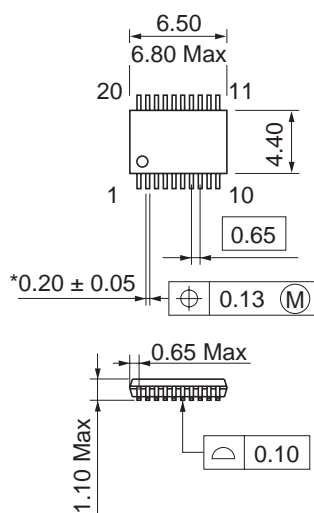


Package Code	FP-20DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.31 g

\*Pd plating

As of January, 2002

Unit: mm



Package Code	TTP-20DAV
JEDEC	—
JEITA	—
Mass (reference value)	0.07 g

\*Pd plating

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