

HD74LVC74

Dual D-type Flip Flops with Preset and Clear

REJ03D0347-0400Z
 (Previous ADE-205-066C (Z))
 Rev.4.00
 Jul. 22, 2004

Description

The HD74LVC74 has independent data, preset, clear, and clock inputs Q and \bar{Q} outputs in a 14 pin package. The logic level present at the data input is transferred to the output during the positive going transition of the clock pulse. Preset and clear are independent of the clock and accomplished by a low level at the appropriate input. 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 $\pm 24\text{ mA} (@V_{CC} = 3.0\text{ V to }5.5\text{ V})$
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LVC74FPEL	SOP-14 pin (JEITA)	FP-14DAV	FP	EL (2,000 pcs/reel)
HD74LVC74TELL	TSSOP-14 pin	TTP-14DV	T	ELL (2,000 pcs/reel)

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

Function Table

Inputs				Outputs	
PR	CLR	CK	D	Q	\bar{Q}
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H ^{*1}	H ^{*1}
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q ₀	\bar{Q}_0
H	H	H	X	Q ₀	\bar{Q}_0
H	H	↓	X	Q ₀	\bar{Q}_0

H: High level

L: Low level

X: Immaterial

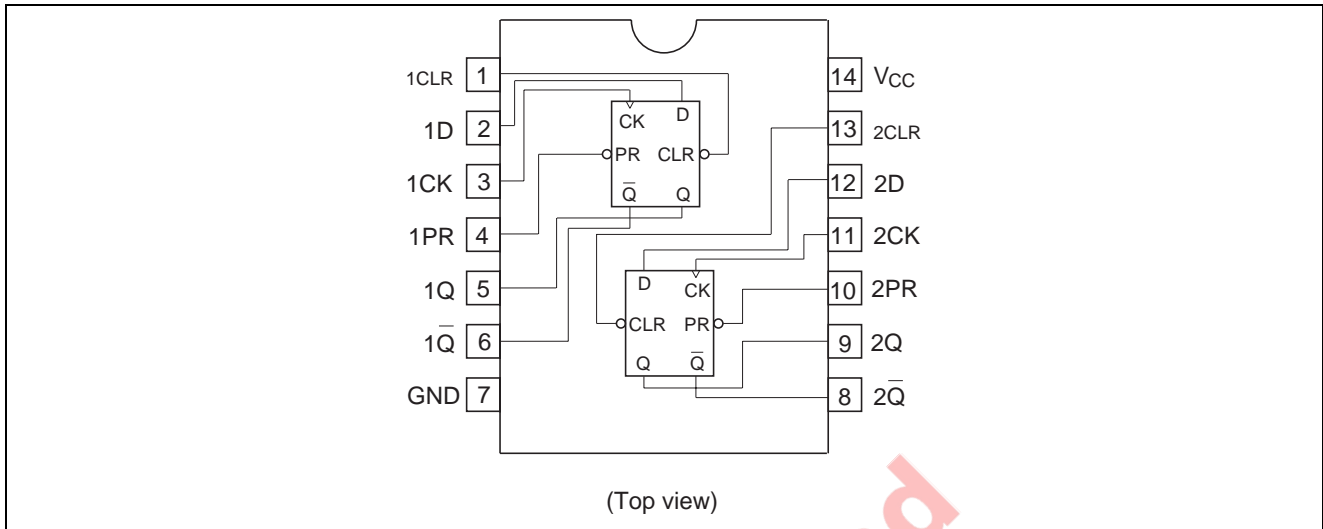
↓: High to Low transition

↑: Low to high transition

Q₀: Level to Q before the indicated steady input conditions was established.

Note: 1. Q and \bar{Q} will remain high as long as preset and clear are low, but Q and \bar{Q} are unpredictable, if preset and clear go high simultaneously.

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 50	mA	$V_O = -0.5\text{ V}$ $V_O = V_{CC} + 0.5\text{ V}$
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	T_{stg}	-65 to +150	$^{\circ}\text{C}$	

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 2.0 to 5.5	V	Data retention At operation
Input / output voltage	V_I V_O	0 to 5.5 0 to V_{CC}	V	PR, CLR, CK, D Q, \bar{Q}
Operating temperature	T_a	-40 to 85	$^{\circ}\text{C}$	
Output current	I_{OH} I_{OL}	-12 -24 ^{*2} 12 24 ^{*2}	mA	$V_{CC} = 2.7\text{ V}$ $V_{CC} = 3.0\text{ V to } 5.5\text{ V}$ $V_{CC} = 2.7\text{ V}$ $V_{CC} = 3.0\text{ V to } 5.5\text{ V}$
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 $\leq 50\%$

Electrical Characteristics

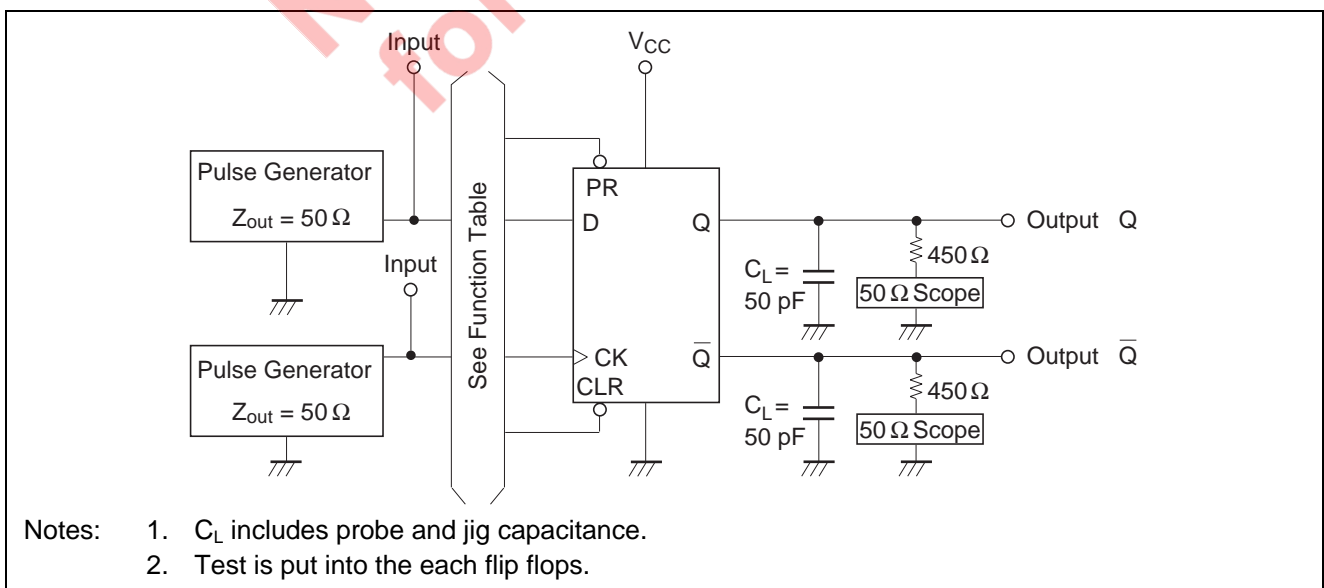
Item	Symbol	V _{CC} (V)	Ta = -40 to 85°C		Unit	Test Conditions
			Min	Max		
Input voltage	V _{IH}	2.7 to 3.6	2.0	—	V	
		4.5 to 5.5	V _{CC} ×0.7	—		
	V _{IL}	2.7 to 3.6	—	0.8	V	
		4.5 to 5.5	—	V _{CC} ×0.3		
Output voltage	V _{OH}	2.7 to 5.5	V _{CC} -0.2	—	V	I _{OH} = -100 μA
		2.7	2.2	—		I _{OH} = -12 mA
		3.0	2.4	—		
		3.0	2.0	—		I _{OH} = -24 mA
		4.5	3.8	—		
	V _{OL}	2.7 to 5.5	—	0.2	V	I _{OL} = 100 μA
		2.7	—	0.4		I _{OL} = 12 mA
		3.0	—	0.55		I _{OL} = 24 mA
		3.0	—	0.55		
		4.5	—	0.55		
Input current	I _{IN}	0 to 5.5	—	±5.0	μA	V _{IN} = 5.5 V or GND
Quiescent supply current	I _{CC}	5.5	—	20	μA	V _{IN} = V _{CC} or GND
	ΔI _{CC}	3.0 to 3.6	—	500	μA	V _{IN} = one input at (V _{CC} -0.6)V, other inputs at V _{CC} or GND

Not recommended for new designs

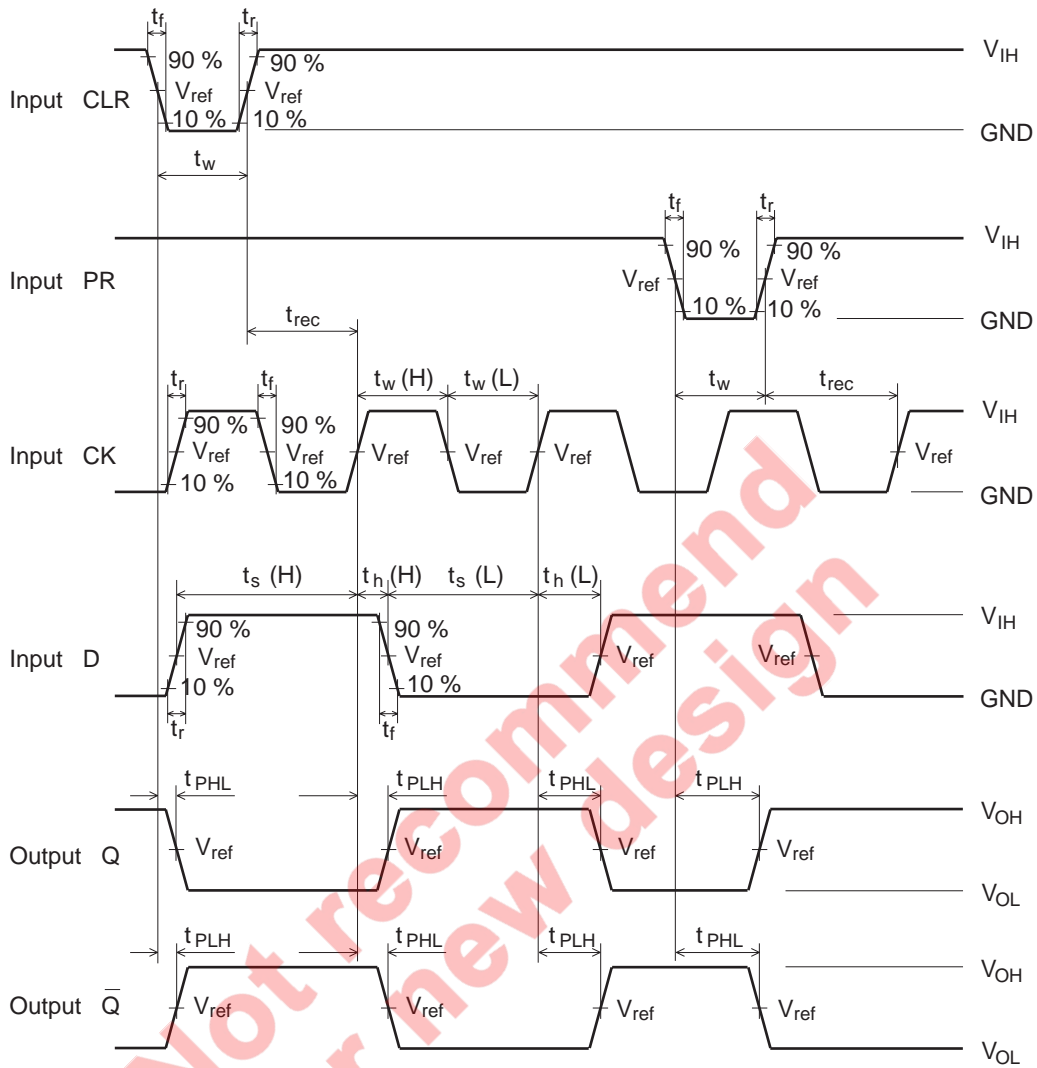
Switching Characteristics

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	150.0	—	—	MHz			
		3.3±0.3	150.0	—	—				
		5.0±0.5	150.0	—	—				
Propagation delay time	t _{PLH}	2.7	—	6.0	9.0	ns	CLK	Q, \bar{Q}	
		3.3±0.3	1.5	5.0	8.0				
		5.0±0.5	—	4.0	6.5				
	t _{PHL}	2.7	—	6.5	9.0	ns	PR or CLR	Q, \bar{Q}	
		3.3±0.3	1.5	5.0	8.0				
		5.0±0.5	—	4.0	6.5				
Setup time	t _{su}	2.7	4.0	—	—	ns			
		3.3±0.3	3.0	—	—				
		5.0±0.5	3.0	—	—				
Hold time	t _h	2.7	2.0	—	—	ns			
		3.3±0.3	2.0	—	—				
		5.0±0.5	2.0	—	—				
Pulse width	t _w	2.7	4.0	—	—	ns	CK		
		3.3±0.3	4.0	—	—				
		5.0±0.5	4.0	—	—				
		PR or CLR	2.7	6.0	—	—	ns	PR or CLR	
			3.3±0.3	5.0	—	—			
			5.0±0.5	4.0	—	—			
Recovery time	t _{rec}	2.7	3.0	—	—	ns			
		3.3±0.3	2.0	—	—				
		5.0±0.5	2.0	—	—				
Input capacitance	C _{IN}	2.7	—	3.0	—	pF			
Output capacitance	C _O	2.7	—	15.0	—	pF			

Test Circuit



Waveforms

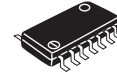
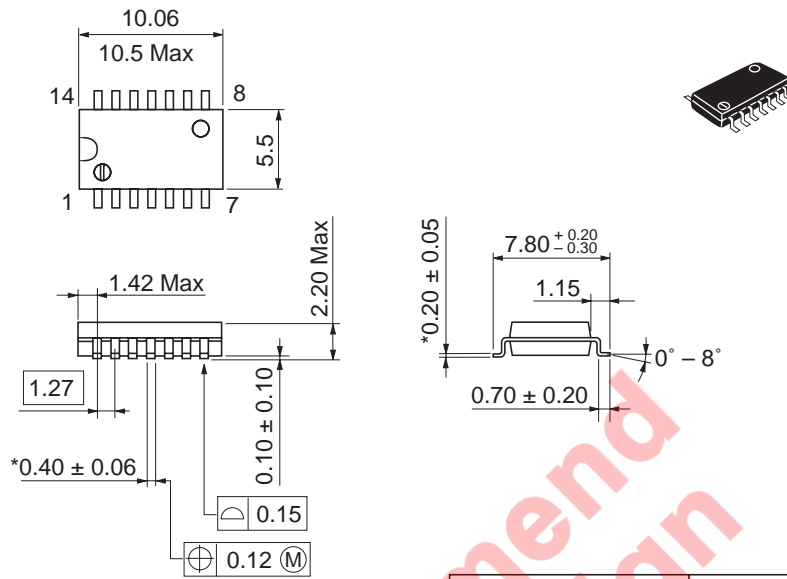


Symbol	$V_{CC} = 2.7\text{ V}, 3.3\pm 0.3\text{ V}$	$V_{CC} = 5.0\pm 0.5\text{ V}$
V_{IH}	2.7 V	V_{CC}
V_{ref}	1.5 V	$50\%V_{CC}$

- Notes:
- $t_r = 2.5\text{ ns}, t_f = 2.5\text{ ns}$
 - Clock pulse input waveform : PRR = 10 MHz, duty cycle 50%
 - Data input waveform : PRR = 5 MHz, duty cycle 50%

Package Dimensions

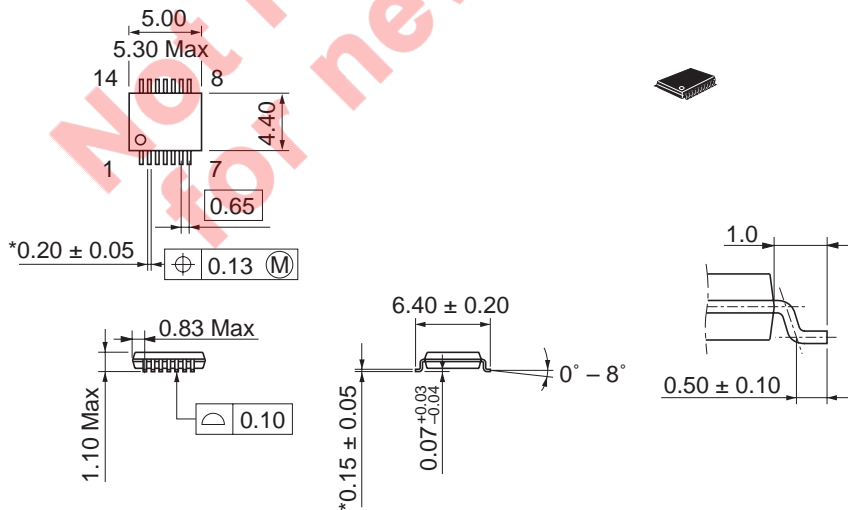
As of January, 2003
Unit: mm



*Ni/Pd/Au plating

Package Code	FP-14DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.23 g

As of January, 2003
Unit: mm



*Ni/Pd/Au plating

Package Code	TTP-14DV
JEDEC	—
JEITA	—
Mass (reference value)	0.05 g

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