

# HD74LS74A

Dual D-type Positive Edge-triggered Flip-Flops  
(with Preset and Clear)

REJ03D0415-0300

Rev.3.00

Jul.22.2005

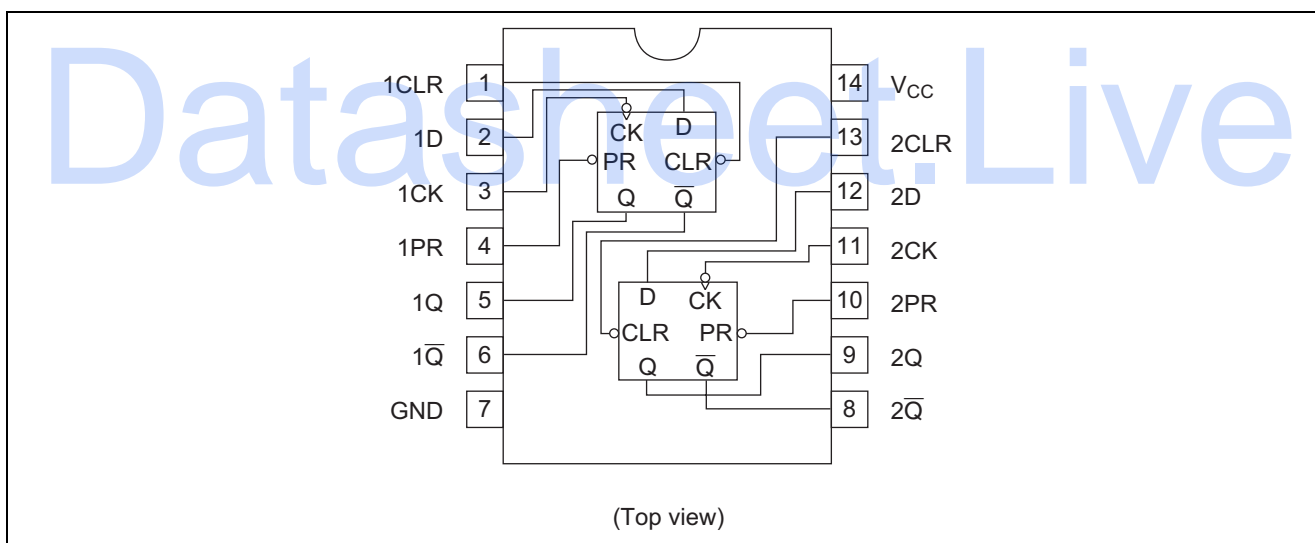
## Features

- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LS74AP	DILP-14 pin	PRDP0014AB-B (DP-14AV)	P	—
HD74LS74AFPEL	SOP-14 pin (JEITA)	PRSP0014DF-B (FP-14DAV)	FP	EL (2,000 pcs/reel)
HD74LS74ARPEL	SOP-14 pin (JEDEC)	PRSP0014DE-A (FP-14DNV)	RP	EL (2,500 pcs/reel)

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

## Pin Arrangement



**Function Table**

Input				Output	
Preset	Clear	Clock	D	Q	$\bar{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q <sub>0</sub>	$\bar{Q}$ <sub>0</sub>

H; high level, L; low level, X; irrelevant, ↑; transition from low to high level,

Q<sub>0</sub>; level of Q before the indicated steady-state input conditions were established.

$\bar{Q}$ <sub>0</sub>; complement of Q<sub>0</sub> or level of Q before the indicated steady-state input conditions were established.

\*; This configuration is nonstable, that is, it will not persist when preset and clear inputs return to their inactive (high) level.

**Absolute Maximum Ratings**

Item	Symbol	Ratings	Unit
Supply voltage	V <sub>CC</sub>	7	V
Input voltage	V <sub>IN</sub>	7	V
Power dissipation	P <sub>T</sub>	400	mW
Storage temperature	T <sub>stg</sub>	-65 to +150	°C

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

**Recommended Operating Conditions**

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	V <sub>CC</sub>	4.75	5.00	5.25	V
Output current	I <sub>OH</sub>	—	—	-400	μA
	I <sub>OL</sub>	—	—	8	mA
Operating temperature	T <sub>opr</sub>	-20	25	75	°C
Clock frequency	f <sub>clock</sub>	0	—	25	MHz
Pulse width	Clock High	t <sub>w</sub>	25	—	ns
	Clear Preset	t <sub>w</sub>	25	—	
Setup time	"H" Data	t <sub>su</sub>	20↑	—	ns
	"L" Data	t <sub>su</sub>	20↑	—	
Hold time	t <sub>h</sub>	5↑	—	—	ns

Note: ↑; The arrow indicates the rising edge.

**Electrical Characteristics**

(Ta = -20 to +75 °C)

Item	Symbol	min.	typ.*	max.	Unit	Condition		
Input voltage	V <sub>IH</sub>	2.0	—	—	V			
	V <sub>IL</sub>	—	—	0.8	V			
Output voltage	V <sub>OH</sub>	2.7	—	—	V	V <sub>CC</sub> = 4.75 V, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = -400 μA		
	V <sub>OL</sub>	—	—	0.5	V	I <sub>OL</sub> = 8 mA		
		—	—	0.4	V	V <sub>CC</sub> = 4.75 V, V <sub>IL</sub> = 0.8 V, V <sub>IH</sub> = 2 V		
Input current	D	I <sub>IH</sub>	—	—	20	μA	V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 2.7 V	
			Clear	—	—			40
			Preset	—	—			40
			Clock	—	—			20
	D	I <sub>IL</sub>	—	—	-0.4	mA	V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 0.4 V	
			Clear	—	—			-0.8
			Preset	—	—			-0.8
			Clock	—	—			-0.4
	D	I <sub>I</sub>	—	—	0.1	mA	V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 7 V	
			Clear	—	—			0.2
			Preset	—	—			0.2
			Clock	—	—			0.1
Short-circuit output current	I <sub>OS</sub>	-20	—	-100	mA	V <sub>CC</sub> = 5.25 V		
Supply current	I <sub>CC</sub> **	—	4	8	mA	V <sub>CC</sub> = 5.25 V		
Input clamp voltage	V <sub>IR</sub>	—	—	-1.5	V	V <sub>CC</sub> = 4.75 V, I <sub>IN</sub> = -18 mA		

Notes: \* V<sub>CC</sub> = 5 V, Ta = 25°C

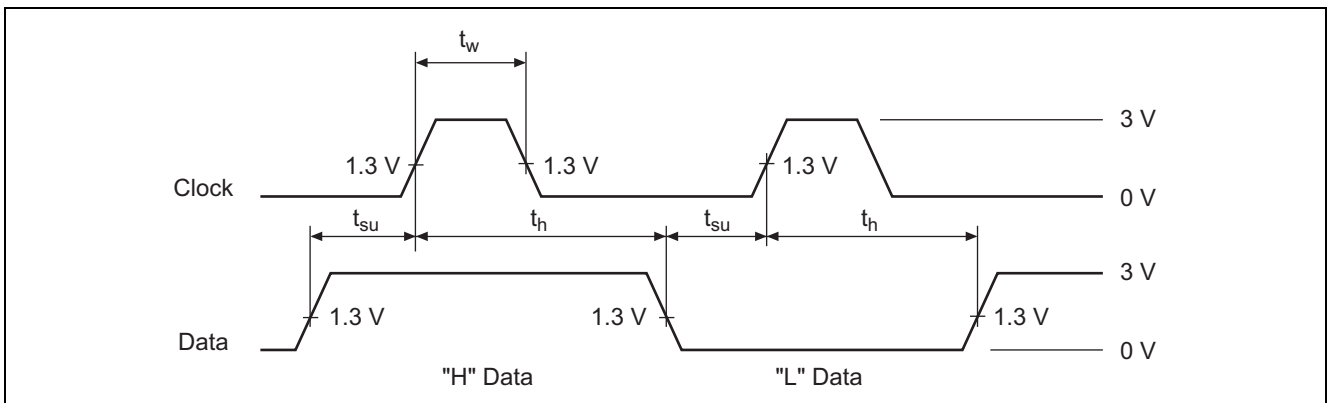
\*\* With all output open, I<sub>CC</sub> is measured with the Q and  $\bar{Q}$  outputs high in turn. At the time of measurement, the clock input is grounded.

**Switching Characteristics**

(V<sub>CC</sub> = 5 V, Ta = 25°C)

Item	Symbol	Inputs	Outputs	min.	typ.	max.	Unit	Condition
Maximum clock frequency	f <sub>max</sub>			25	33		MHz	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 2 kΩ
Propagation delay time	t <sub>PLH</sub>	Clear, Clock or Preset	Q, $\bar{Q}$	—	13	25	ns	
	t <sub>PHL</sub>			—	25	40	ns	

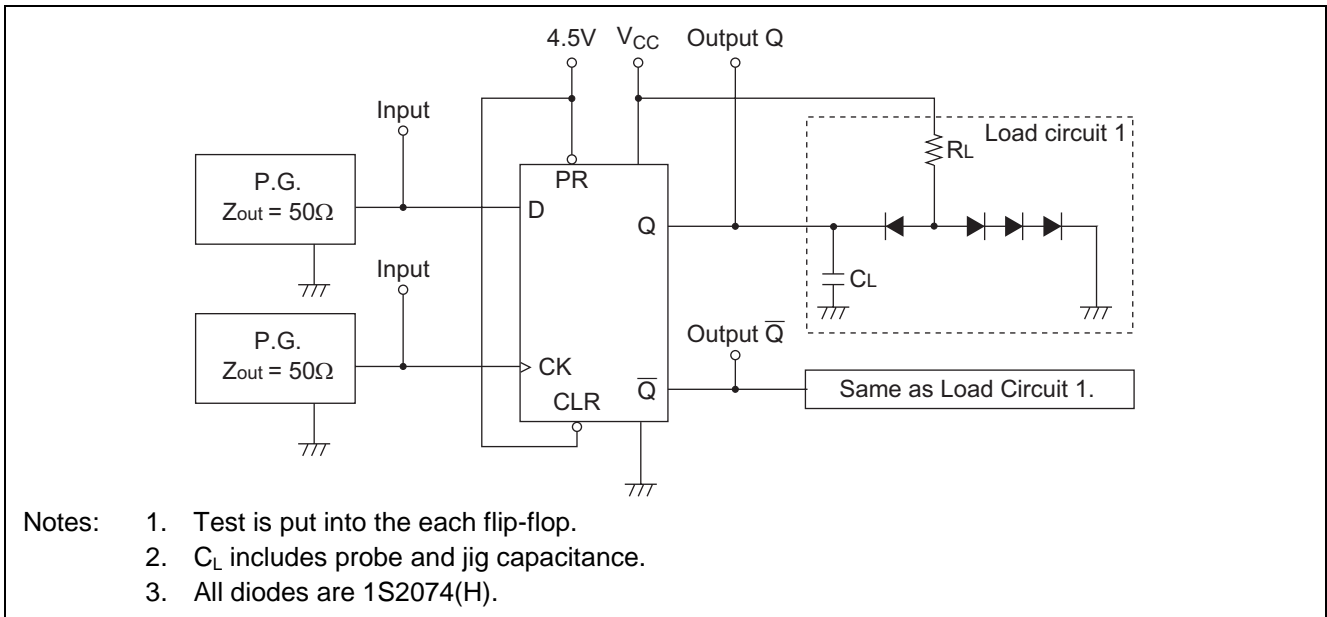
**Timing Definition**



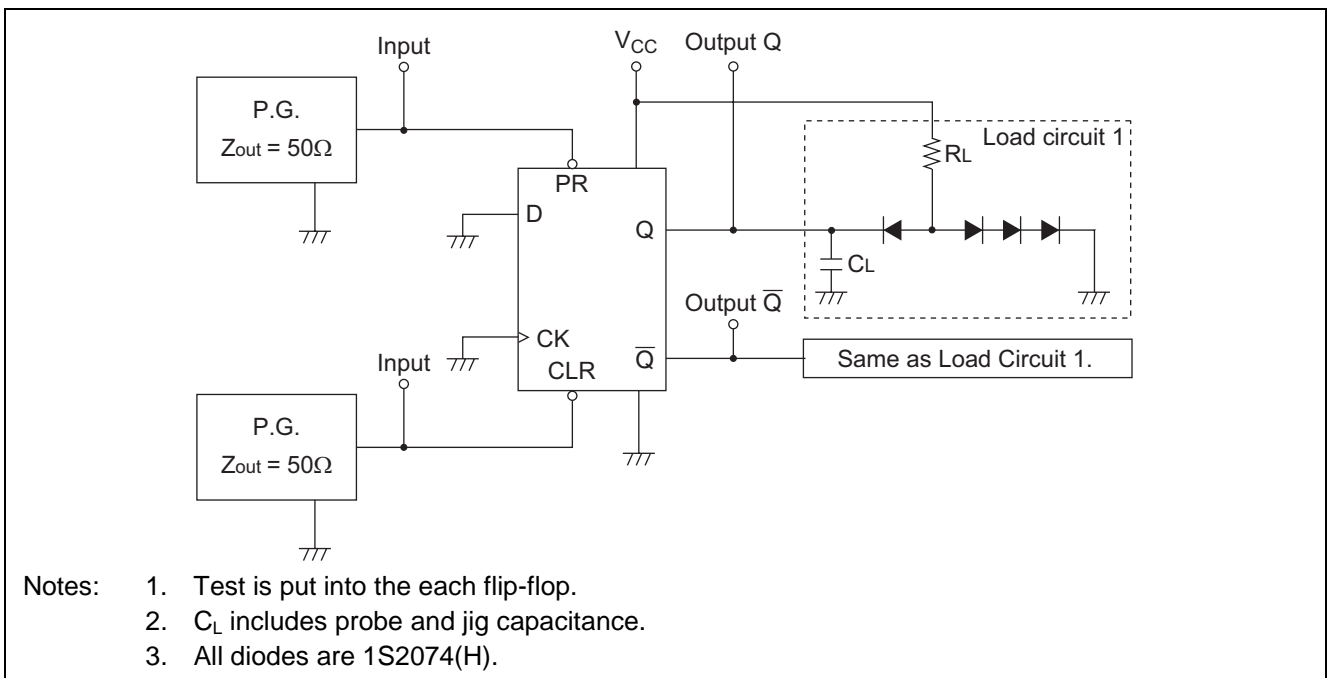
## Testing Method

### Test Circuit

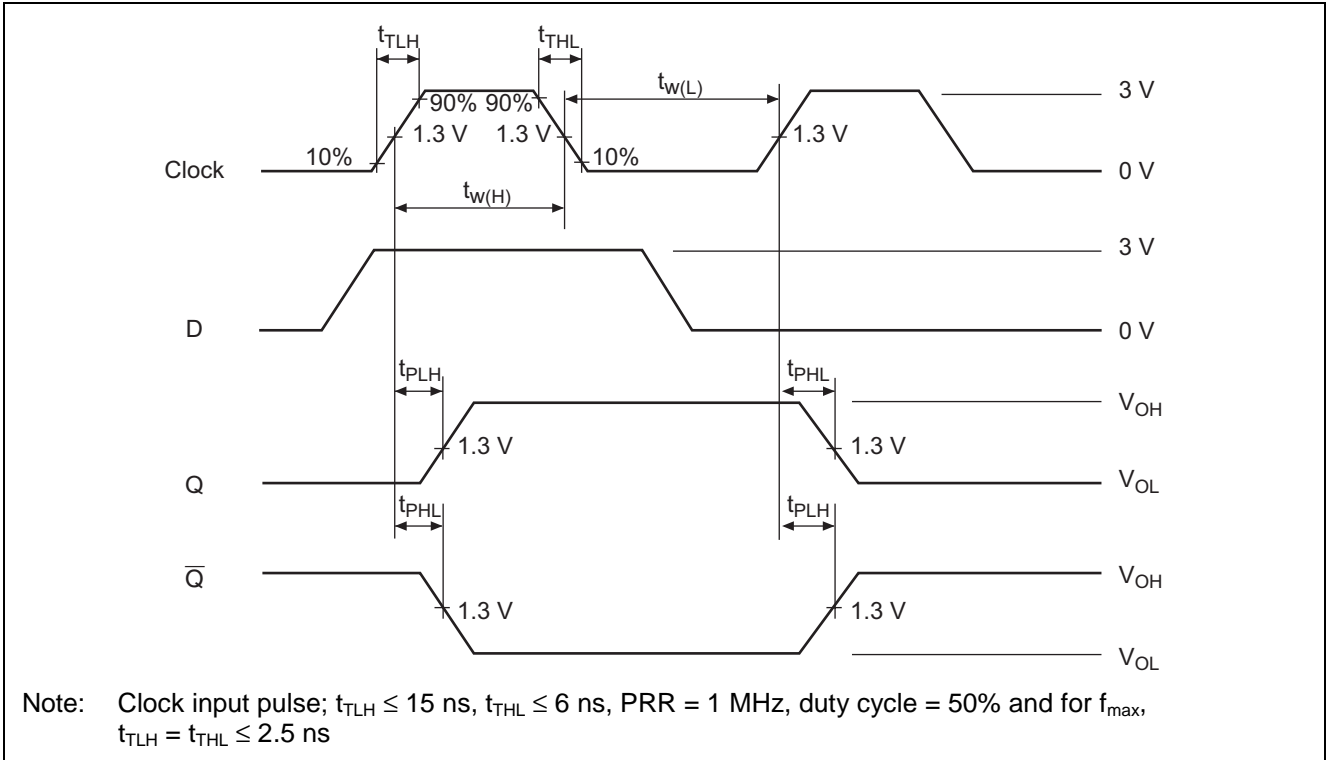
1.  $f_{max}$ ,  $t_{PLH}$ ,  $t_{PHL}$  (Clock  $\rightarrow$  Q,  $\bar{Q}$ )



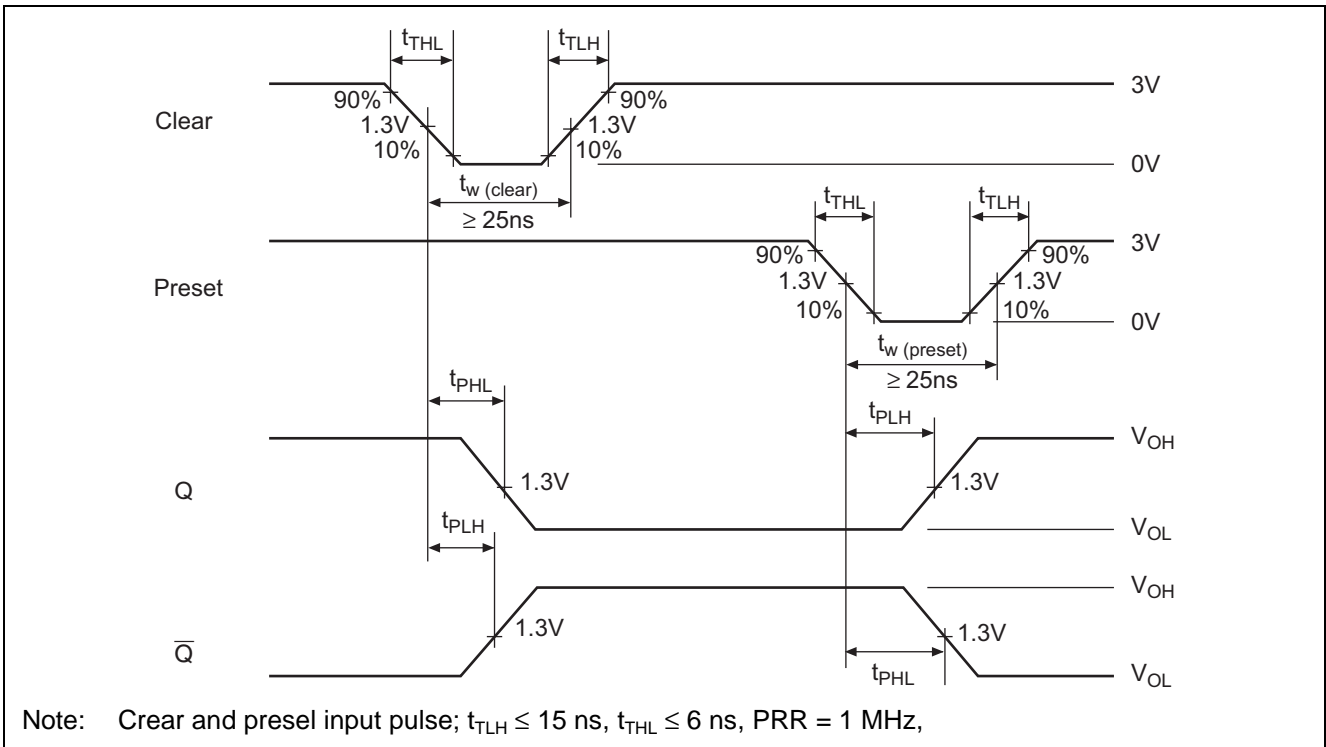
2.  $t_{PHL}$ ,  $t_{PLH}$  (Clear or Preset  $\rightarrow$  Q,  $\bar{Q}$ )



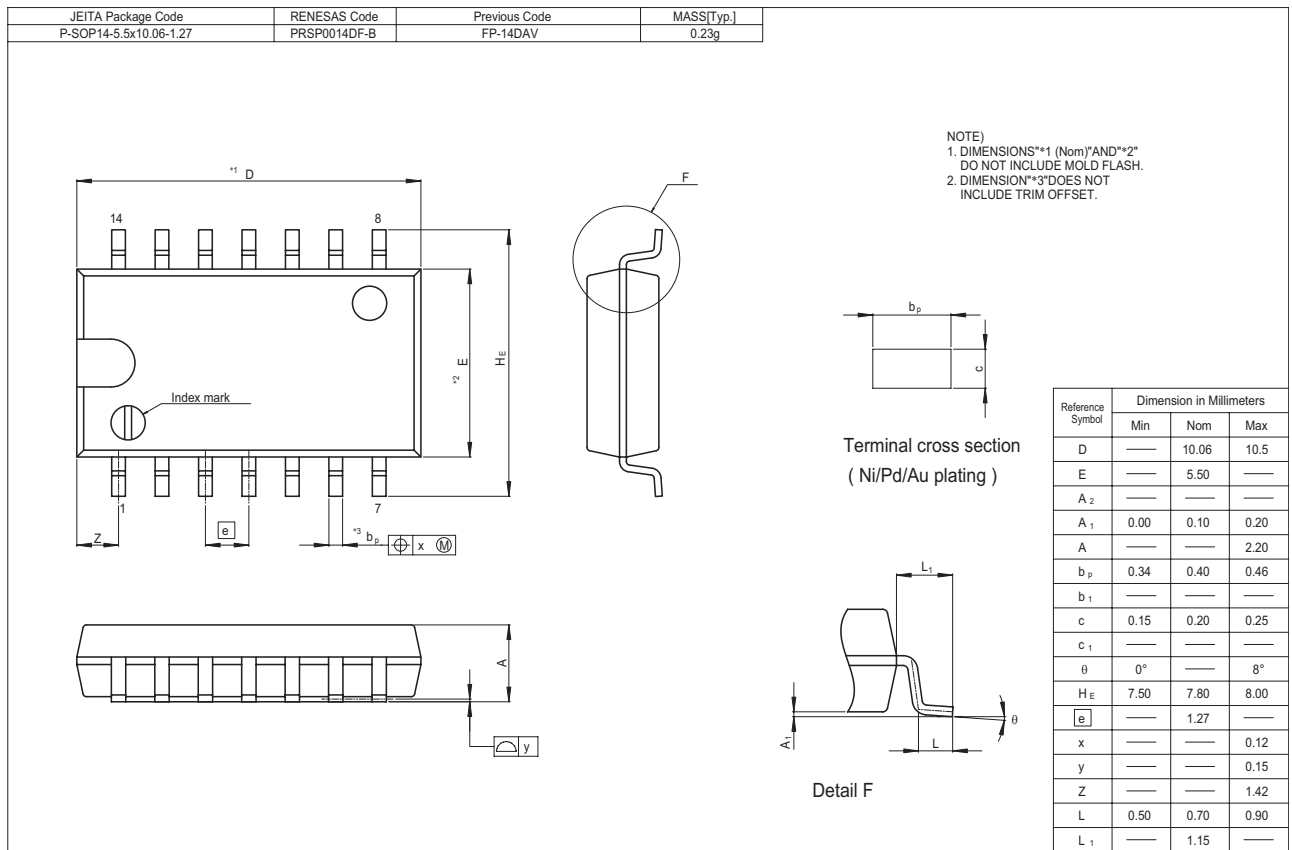
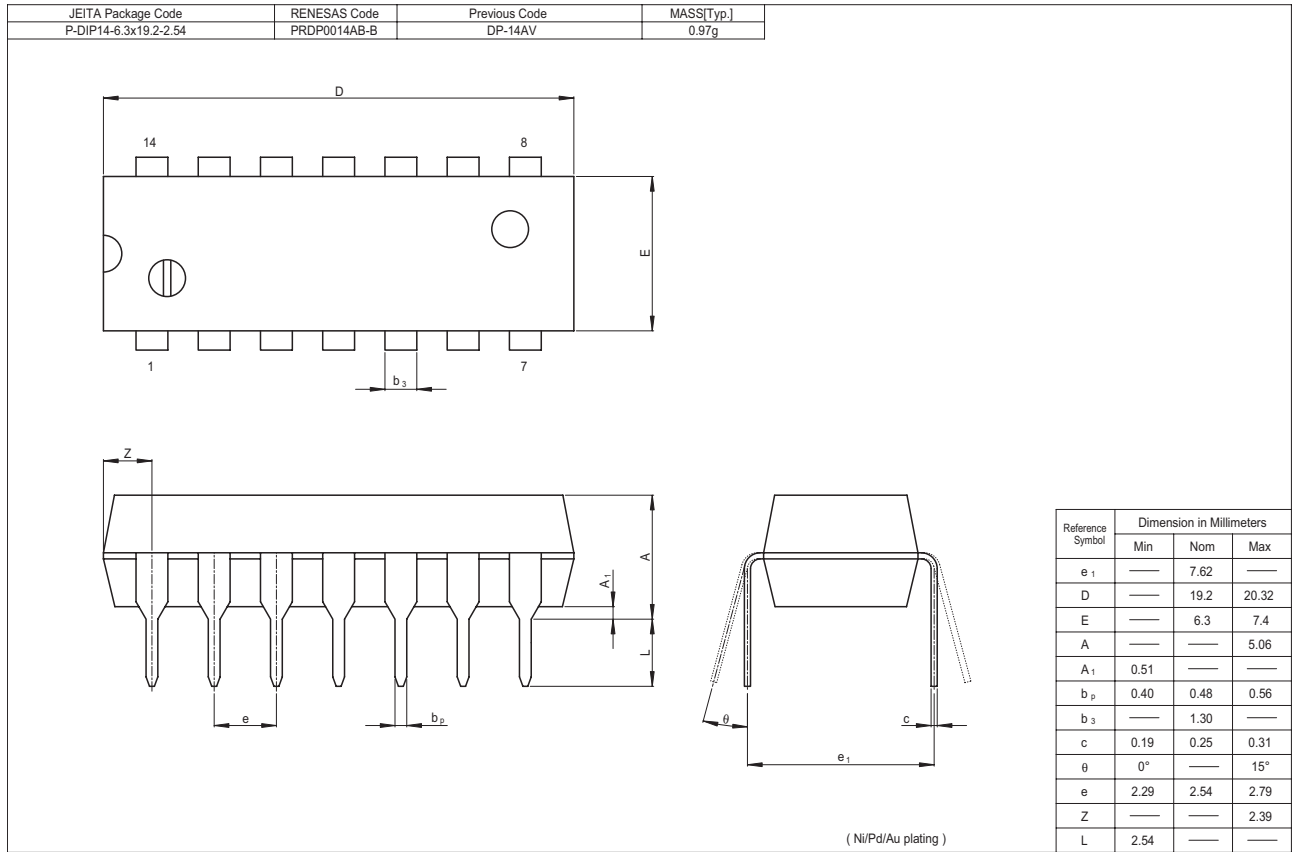
Waveforms 1



Waveforms 2

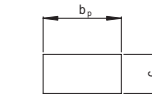
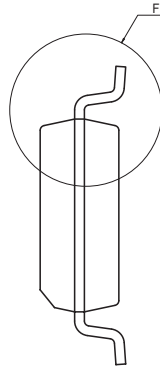
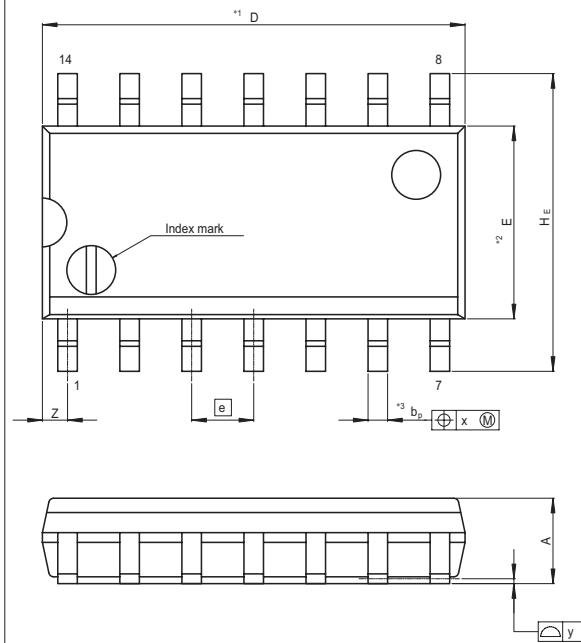


Package Dimensions

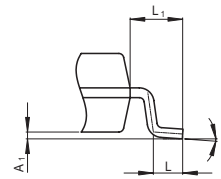


# HD74LS74A

JEITA Package Code P-SOP14-3.95x8.65-1.27	RENESAS Code PRSP0014DE-A	Previous Code FP-14DNV	MASS[Typ.] 0.13g
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Terminal cross section  
( Ni/Pd/Au plating )



Detail F

NOTE)  
1. DIMENSIONS\*1 (Nom)\*AND\*2\*  
DO NOT INCLUDE MOLD FLASH.  
2. DIMENSION\*3\*DOES NOT  
INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	8.65	9.05
E	—	3.95	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.10	0.14	0.25
A	—	—	1.75
b <sub>p</sub>	0.34	0.40	0.46
b <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	5.80	6.10	6.20
e	—	1.27	—
x	—	—	0.25
y	—	—	0.15
Z	—	—	0.635
L	0.40	0.60	1.27
L <sub>1</sub>	—	1.08	—

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