

# HD74LS74A

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

R04DS0012EJ0400  
 (Previous: REJ03D0415-0300)  
 Rev.4.00  
 Dec 21, 2011

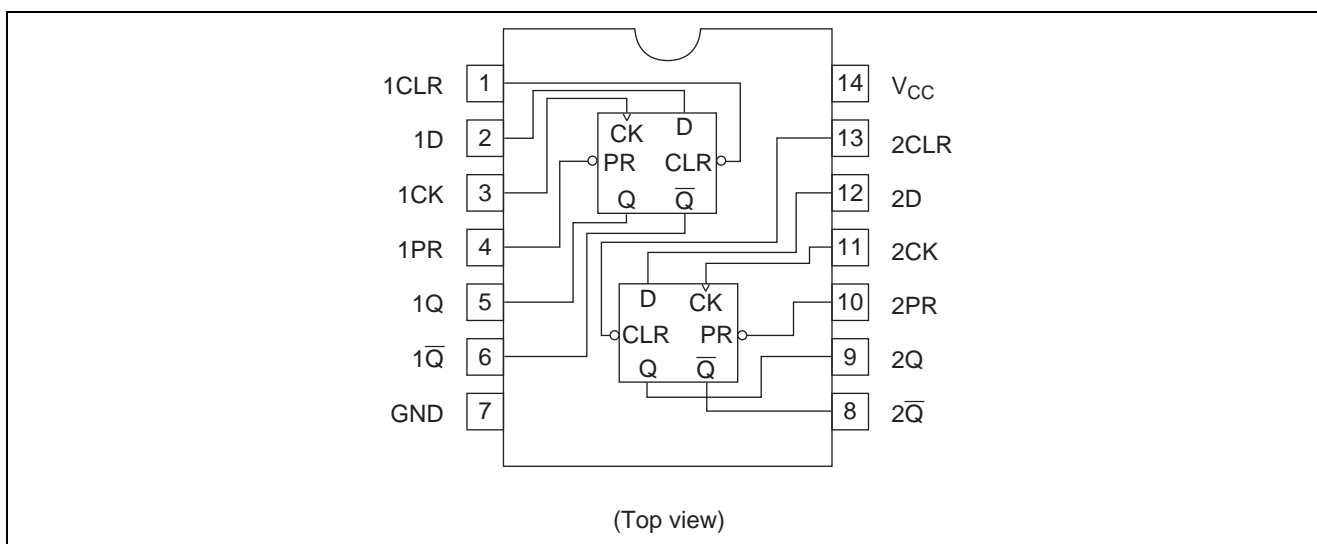
### Features

- 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	Q̄
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>	Q̄ <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.

Q̄<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	$V_{CC}$	7	V
Input voltage	$V_{IN}$	7	V
Power dissipation	$P_T$	400	mW
Storage temperature	$T_{stg}$	-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	$V_{CC}$	4.75	5.00	5.25	V
Output current	$I_{OH}$	—	—	-400	$\mu$ A
	$I_{OL}$	—	—	8	mA
Operating temperature	$T_{opr}$	-20	25	75	°C
Clock frequency	$f_{clock}$	0	—	25	MHz
Pulse width	Clock High	$t_w$	25	—	ns
	Clear Preset	$t_w$	25	—	
Setup time	"H" Data	$t_{su}$	20 $\uparrow$	—	ns
	"L" Data	$t_{su}$	20 $\uparrow$	—	
Hold time	$t_h$	5 $\uparrow$	—	—	ns

Note:  $\uparrow$ ; The arrow indicates the rising edge.

## Electrical Characteristics

( $T_a = -20$  to  $+75$  °C)

Item	Symbol	min.	typ.*	max.	Unit	Condition	
Input voltage	$V_{IH}$	2.0	—	—	V		
	$V_{IL}$	—	—	0.8	V		
Output voltage	$V_{OH}$	2.7	—	—	V	$V_{CC} = 4.75$ V, $V_{IH} = 2$ V, $V_{IL} = 0.8$ V, $I_{OH} = -400$ $\mu$ A	
	$V_{OL}$	—	—	0.5	V	$I_{OL} = 8$ mA, $V_{CC} = 4.75$ V, $V_{IL} = 0.8$ V, $V_{IH} = 2$ V $I_{OL} = 4$ mA	
		—	—	0.4			
Input current	D	$I_{IH}$	—	—	20	$\mu$ A	$V_{CC} = 5.25$ V, $V_I = 2.7$ V
	Clear		—	—	40		
	Preset		—	—	40		
	Clock		—	—	20		
	D	$I_{IL}$	—	—	-0.4	mA	$V_{CC} = 5.25$ V, $V_I = 0.4$ V
	Clear		—	—	-0.8		
	Preset		—	—	-0.8		
	Clock		—	—	-0.4		
	D	$I_I$	—	—	0.1	mA	$V_{CC} = 5.25$ V, $V_I = 7$ V
	Clear		—	—	0.2		
	Preset		—	—	0.2		
	Clock		—	—	0.1		
Short-circuit output current	$I_{OS}$	-20	—	-100	mA	$V_{CC} = 5.25$ V	
Supply current	$I_{CC}^{**}$	—	4	8	mA	$V_{CC} = 5.25$ V	
Input clamp voltage	$V_{IR}$	—	—	-1.5	V	$V_{CC} = 4.75$ V, $I_{IN} = -18$ mA	

Notes: \*  $V_{CC} = 5$  V,  $T_a = 25$  °C

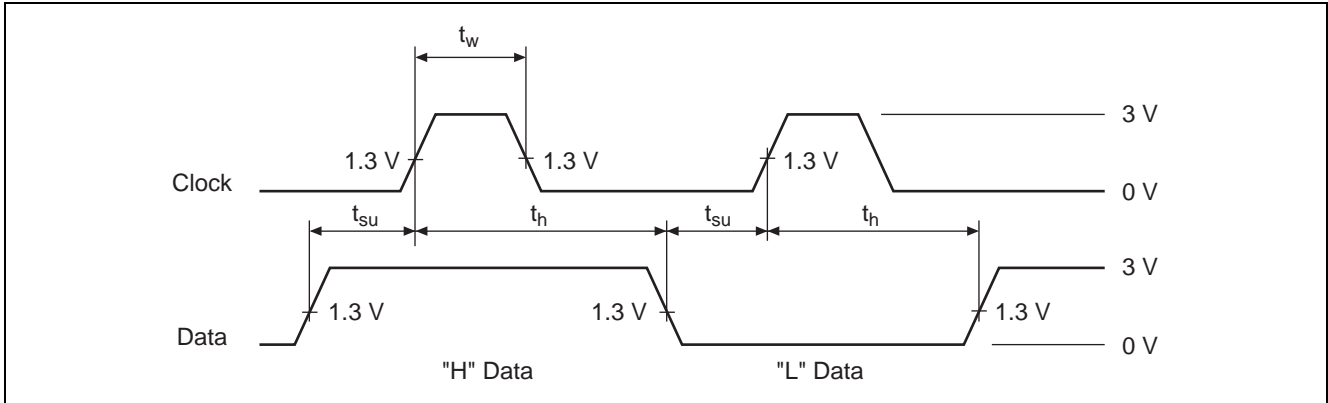
\*\* With all output open,  $I_{CC}$  is measured with the Q and  $\bar{Q}$  outputs high in turn. At the time of measurement, the clock input is grounded.

### Switching Characteristics

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

Item	Symbol	Inputs	Outputs	min.	typ.	max.	Unit	Condition
Maximum clock frequency	$f_{max}$			25	33		MHz	$C_L = 15\text{ pF}$ , $R_L = 2\text{ k}\Omega$
Propagation delay time	$t_{PLH}$	Clear, Clock or Preset	Q, $\bar{Q}$	—	13	25	ns	
	$t_{PHL}$			—	25	40	ns	

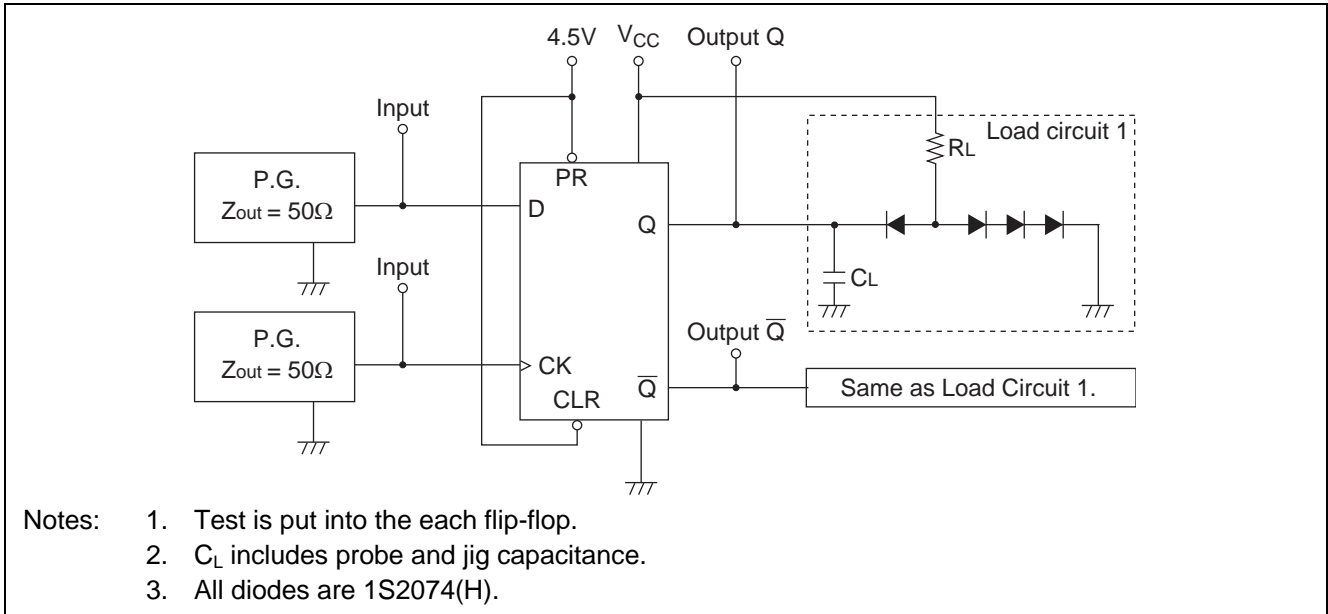
### Timing Definition



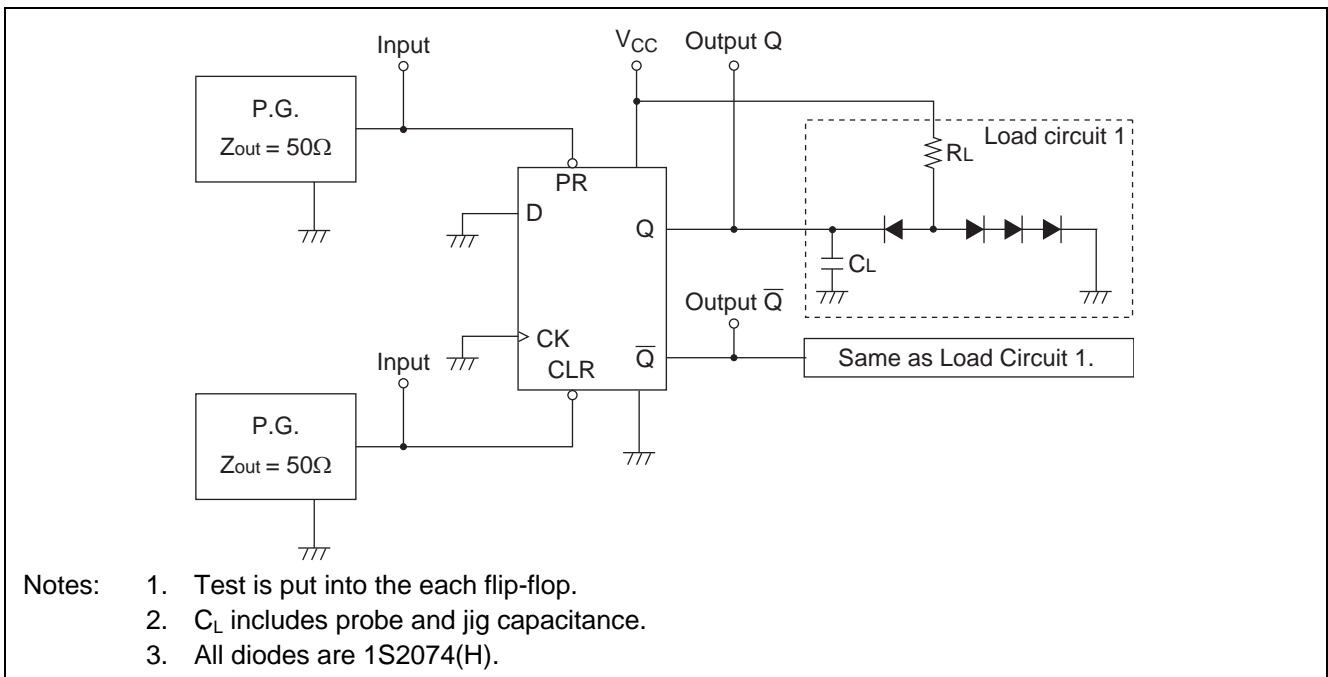
## Testing Method

### Test Circuit

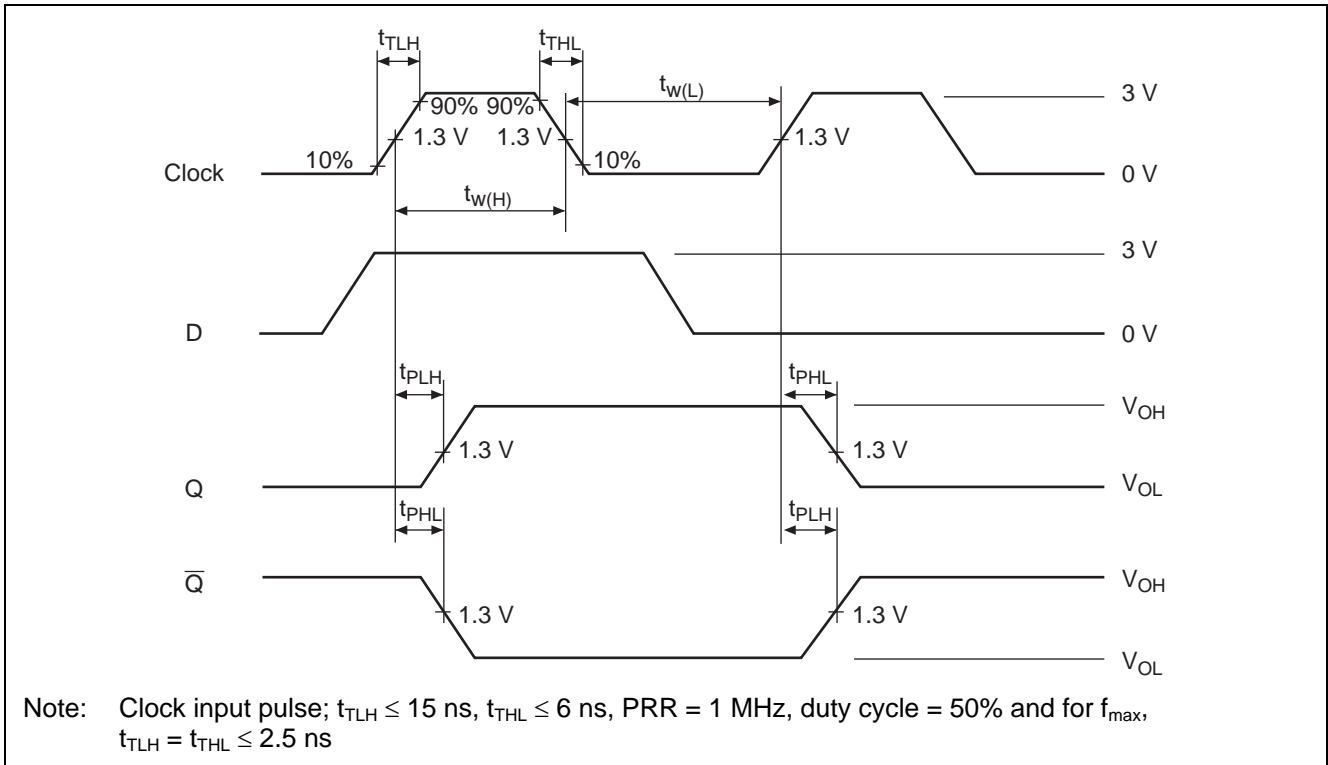
1.  $f_{max}$ ,  $t_{PLH}$ ,  $t_{PHL}$  (Clock  $\rightarrow$  Q,  $\bar{Q}$ )



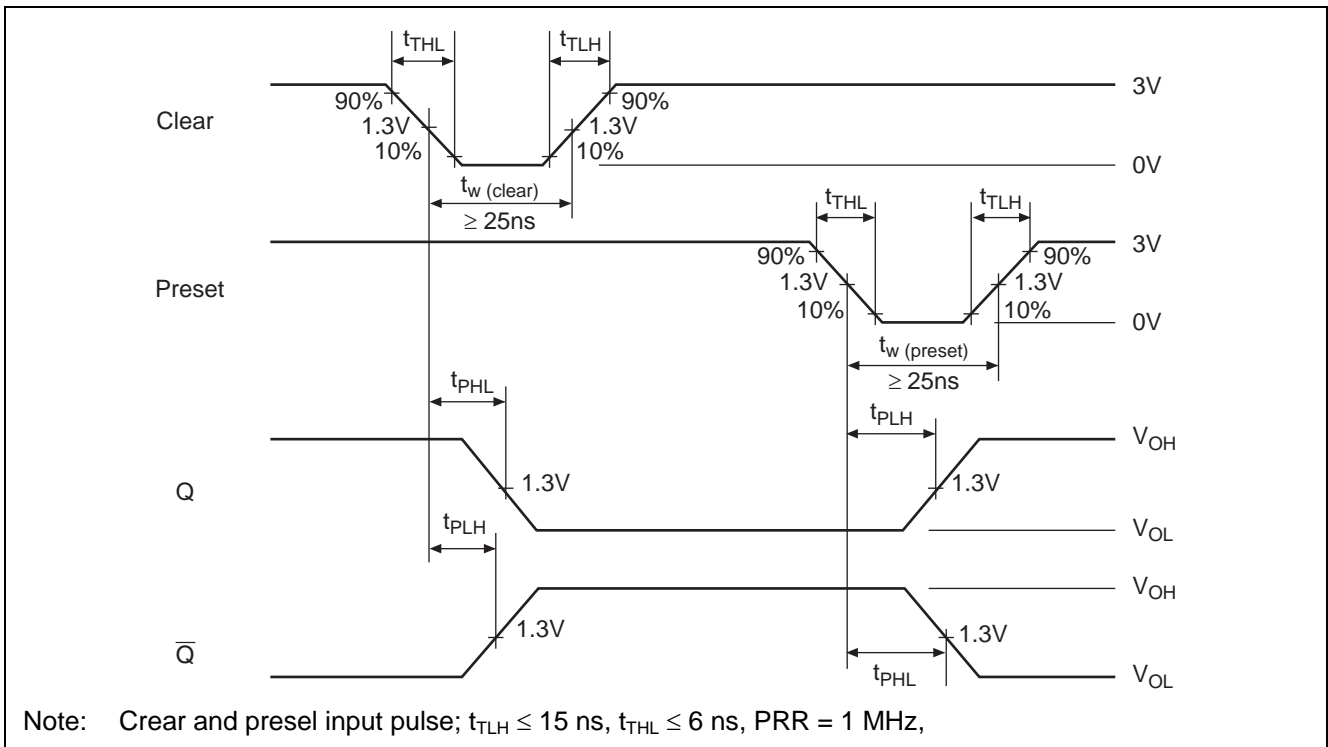
2.  $t_{PHL}$ ,  $t_{PLH}$  (Clear or Preset  $\rightarrow$  Q,  $\bar{Q}$ )



Waveforms 1

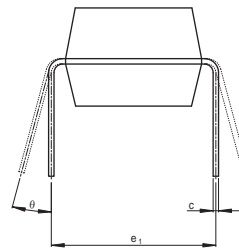
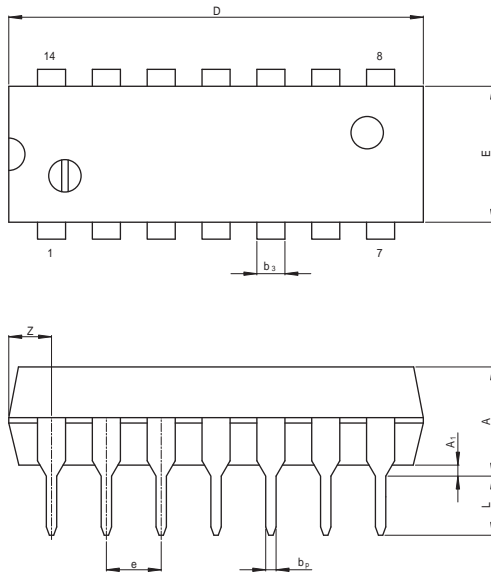


Waveforms 2



Package Dimensions

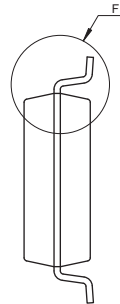
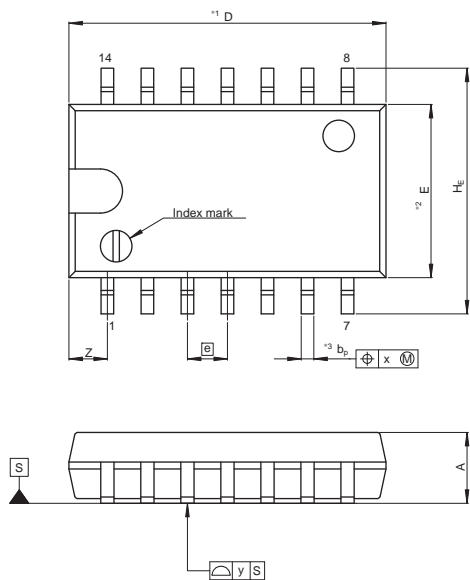
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP14-6.3x19.2-2.54	PRDP0014AB-B	DP-14AV	0.97g



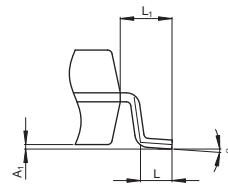
(Ni/Pd/Au plating)

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e <sub>1</sub>	—	7.62	—
D	—	19.2	20.32
E	—	6.3	7.4
A	—	—	5.06
A <sub>1</sub>	0.51	—	—
b <sub>p</sub>	0.40	0.48	0.56
b <sub>3</sub>	—	1.30	—
c	0.19	0.25	0.31
θ	0°	—	15°
e	2.29	2.54	2.79
Z	—	—	2.39
L	2.54	—	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP14-5.5x10.06-1.27	PRSP0014DF-B	FP-14DAV	0.23g



Terminal cross section (Ni/Pd/Au plating)



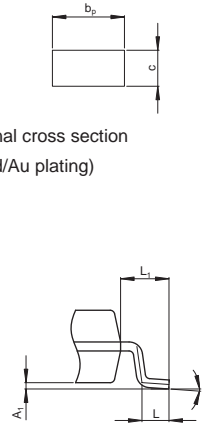
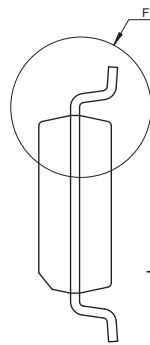
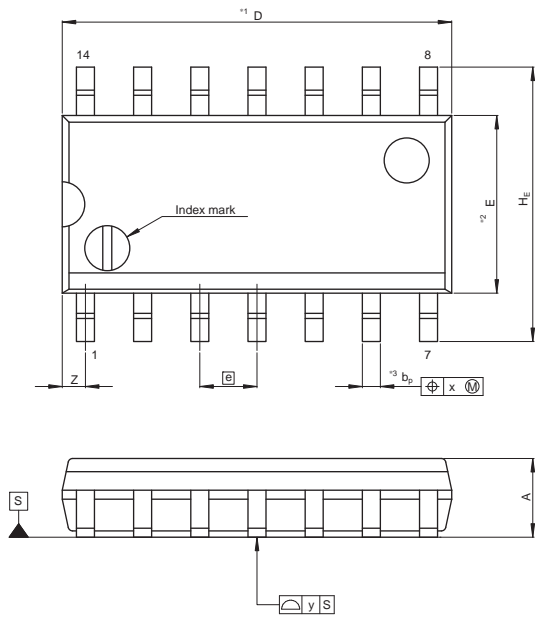
Detail F

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	—	10.06	10.5
E	—	5.50	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.00	0.10	0.20
A	—	—	2.20
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>	7.50	7.80	8.00
e	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	1.42
L	0.50	0.70	0.90
L <sub>1</sub>	—	1.15	—

# HD74LS74A

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP14-3.95x8.65-1.27	PRSP0014DE-A	FP-14DNV	0.13g



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>	—	—	—
$\theta$	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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