

HD74LS74A

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

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

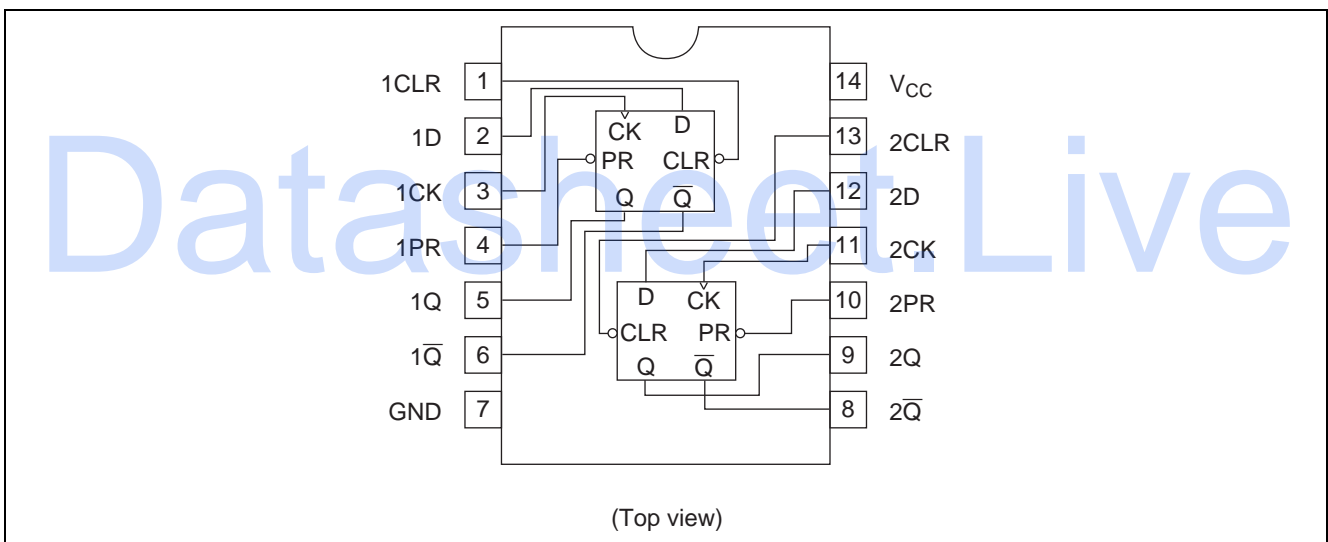
Features

- 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 ₀	Q̄ ₀

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

Q₀; level of Q before the indicated steady-state input conditions were established.

Q̄₀; complement of Q̄₀ 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	μ 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, $I_{OH} = -400$ μ 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	μ 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

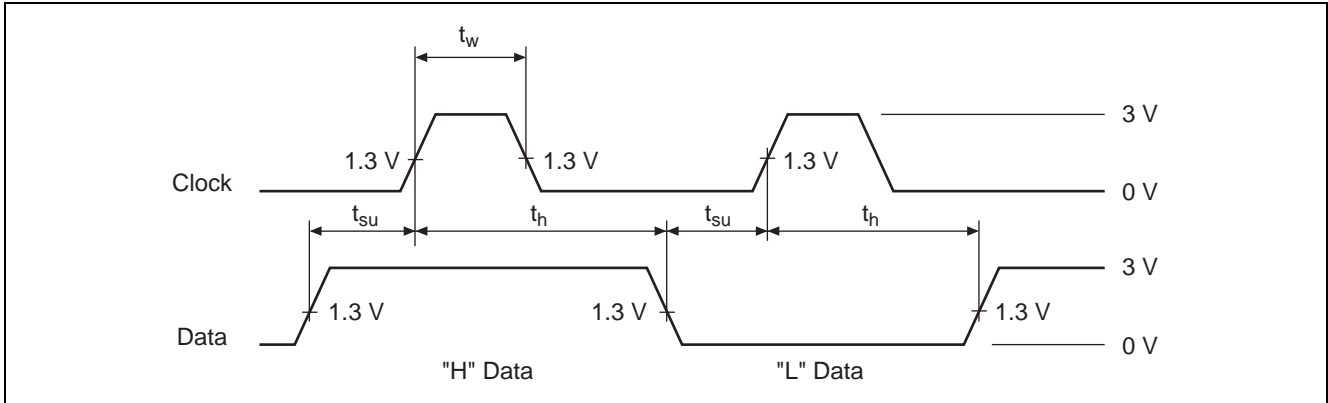
** With all output open, I_{CC} is measured with the Q and \bar{Q} outputs high in turn. At the time of measurement, the clock input is grounded.

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	

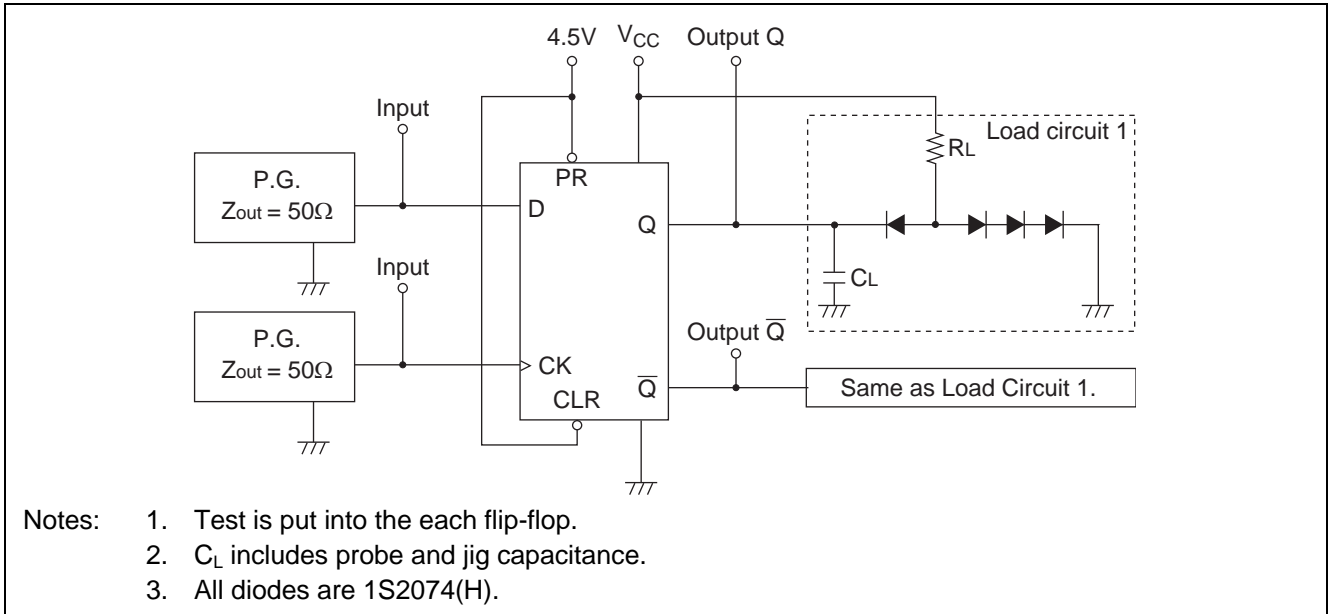
Timing Definition



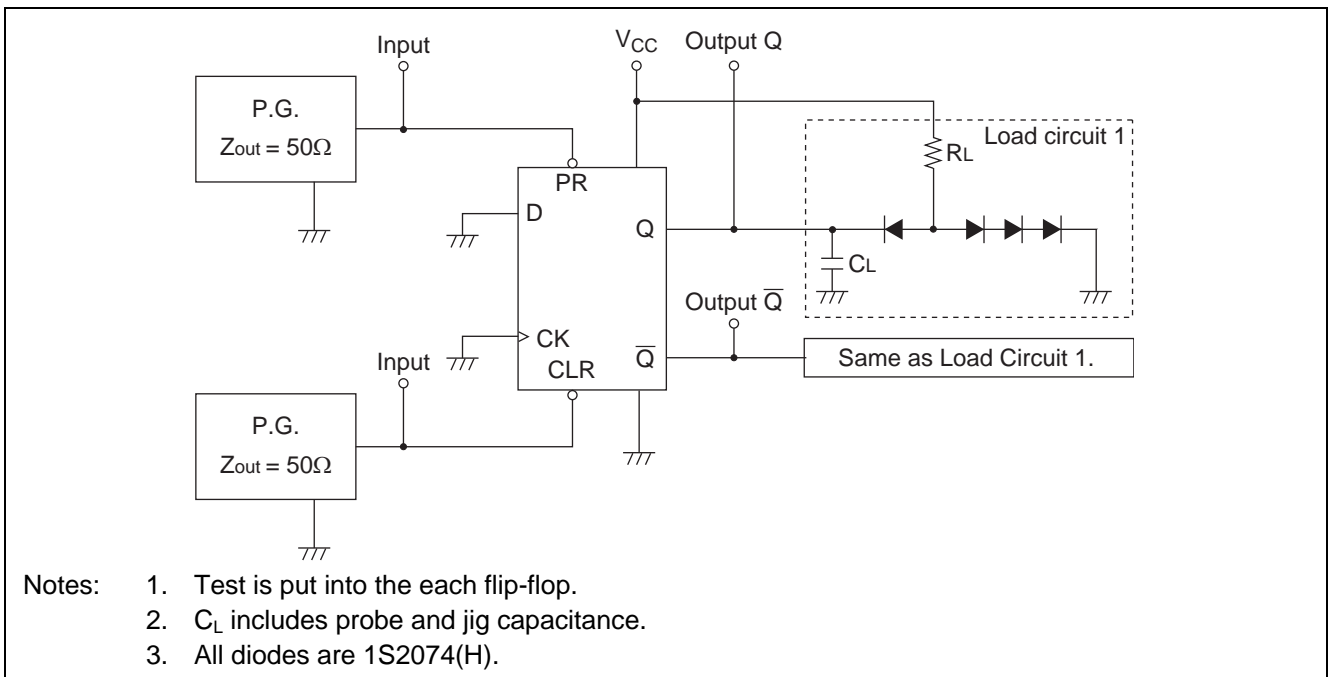
Testing Method

Test Circuit

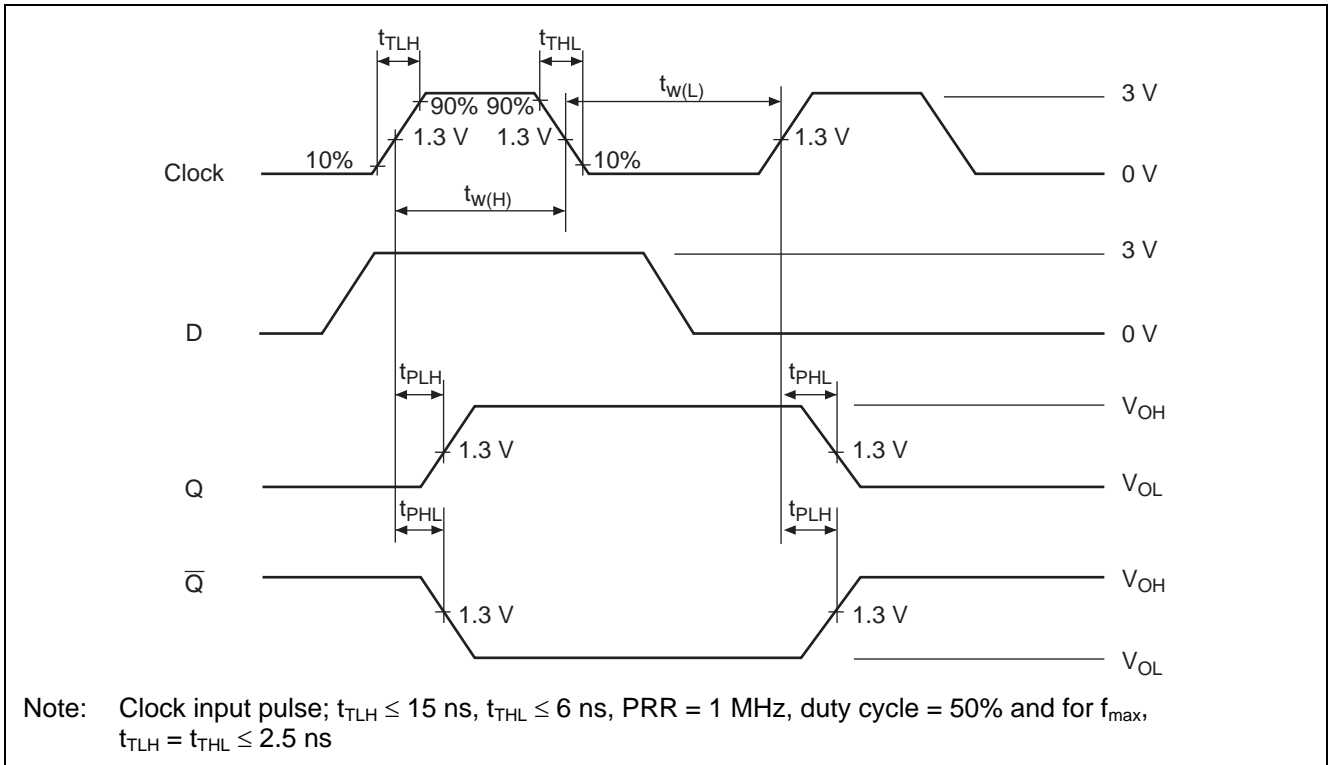
1. f_{max} , t_{PLH} , t_{PHL} (Clock \rightarrow Q, \bar{Q})



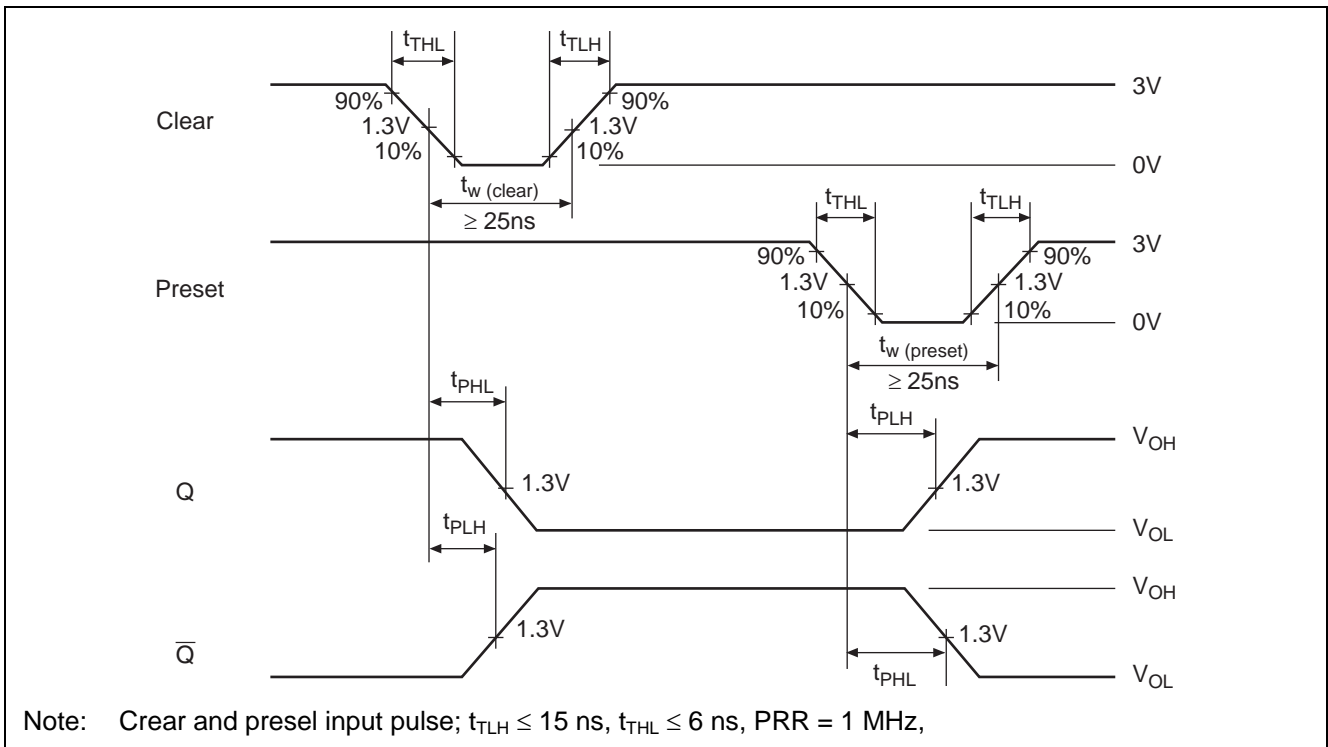
2. t_{PHL} , t_{PLH} (Clear or Preset \rightarrow Q, \bar{Q})



Waveforms 1

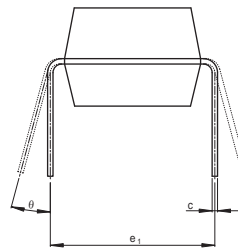
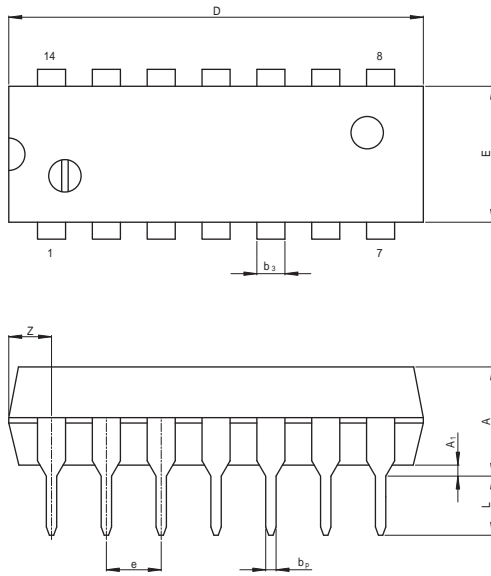


Waveforms 2



Package Dimensions

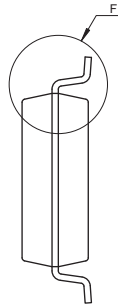
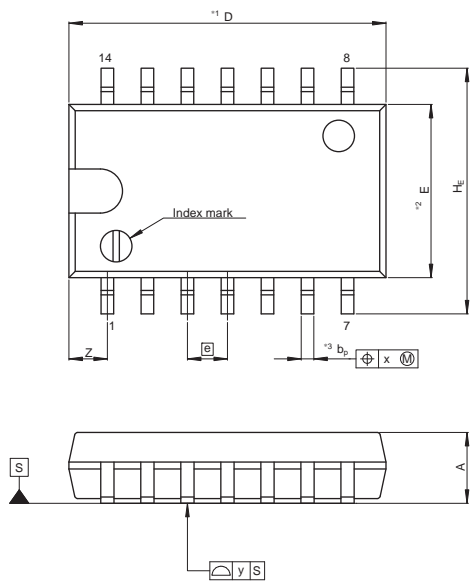
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP14-6.3x19.2-2.54	PRDP0014AB-B	DP-14AV	0.97g



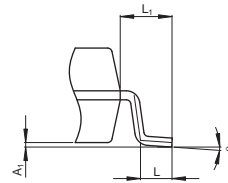
(Ni/Pd/Au plating)

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e ₁	—	7.62	—
D	—	19.2	20.32
E	—	6.3	7.4
A	—	—	5.06
A ₁	0.51	—	—
b _p	0.40	0.48	0.56
b ₃	—	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)



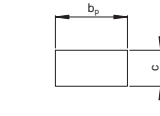
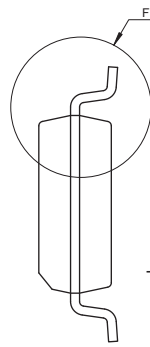
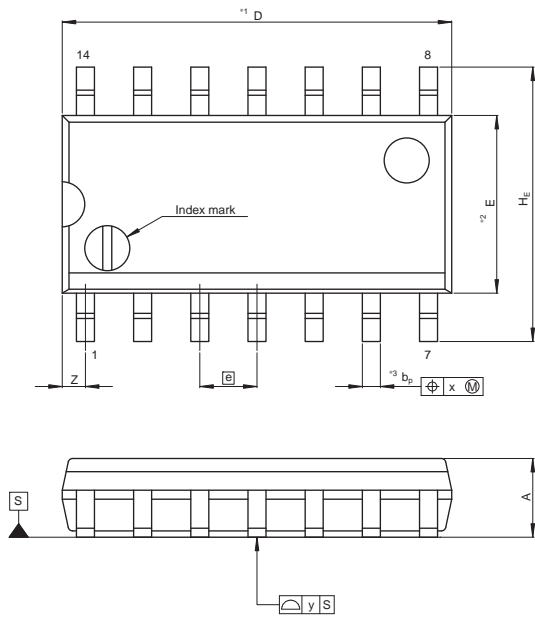
Detail F

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

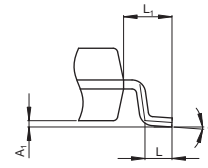
Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	10.06	10.5
E	—	5.50	—
A ₂	—	—	—
A ₁	0.00	0.10	0.20
A	—	—	2.20
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
HE	7.50	7.80	8.00
e	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	1.42
L	0.50	0.70	0.90
L ₁	—	1.15	—

HD74LS74A

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



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 ₂	—	—	—
A ₁	0.10	0.14	0.25
A	—	—	1.75
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	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 ₁	—	1.08	—

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