

HD74LS74A

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

REJ03D0415-0300

Rev.3.00

Jul.22.2005

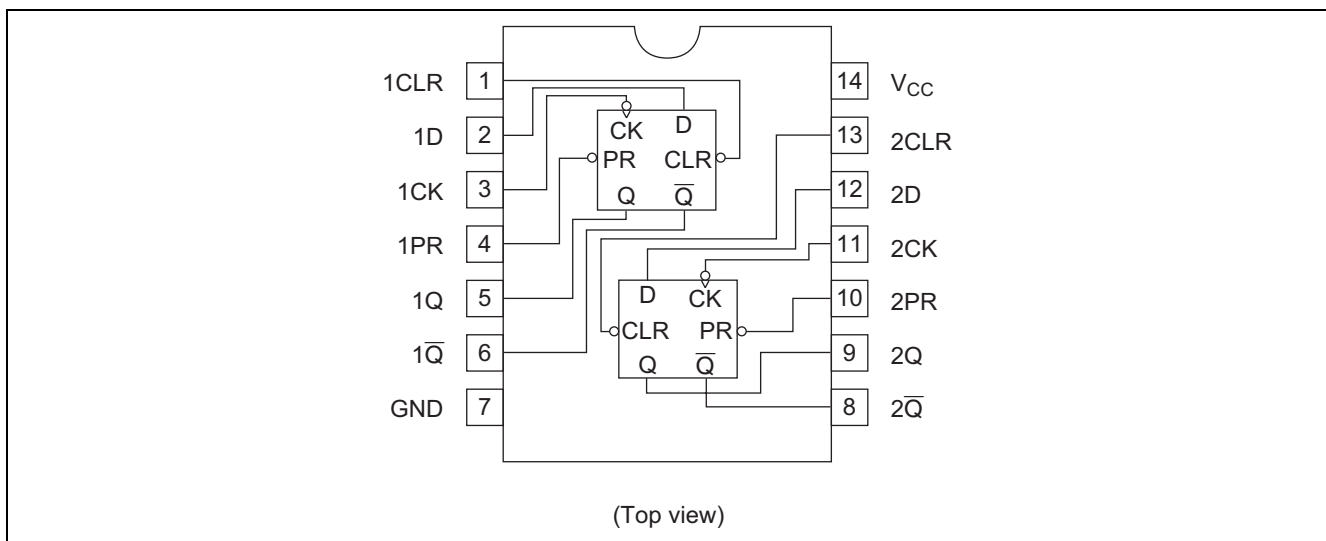
Features

- 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 ₀	\bar{Q} 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.

\bar{Q} ₀; complement of Q₀ 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	μA
	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↑	—	ns
	"L" Data	t _{su}	20↑	—	
Hold time	t _h	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 _{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 μA		
	V _{OL}	—	—	0.5	V	I _{OL} = 8 mA		
		—	—	0.4	V	V _{CC} = 4.75 V, V _{IL} = 0.8 V, V _{IH} = 2 V		
Input current	D	I _{IH}	—	—	20	μA	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, Ta = 25°C

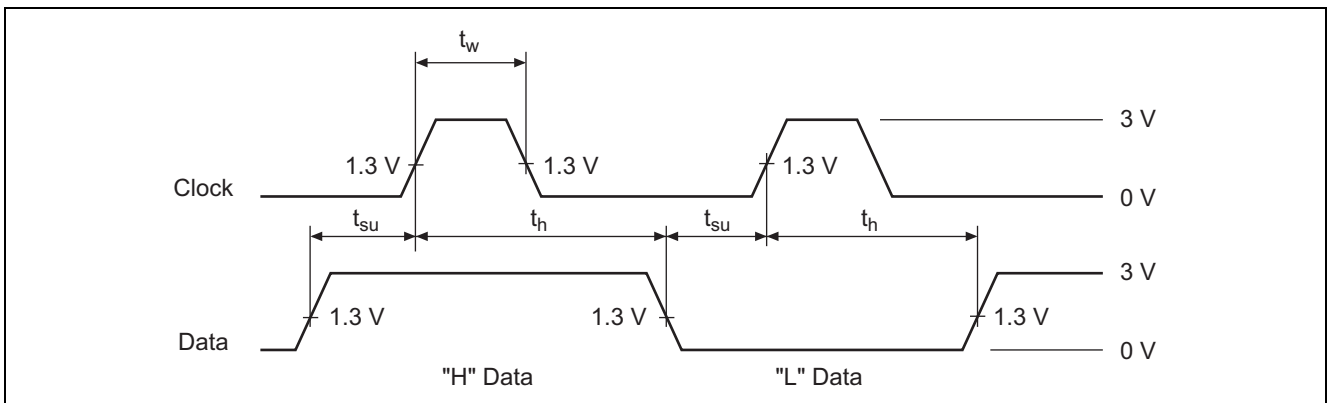
** With all output open, I_{CC} is measured with the Q and \bar{Q} outputs high in turn. At the time of measurement, the clock input is grounded.

Switching Characteristics

(V_{CC} = 5 V, Ta = 25°C)

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

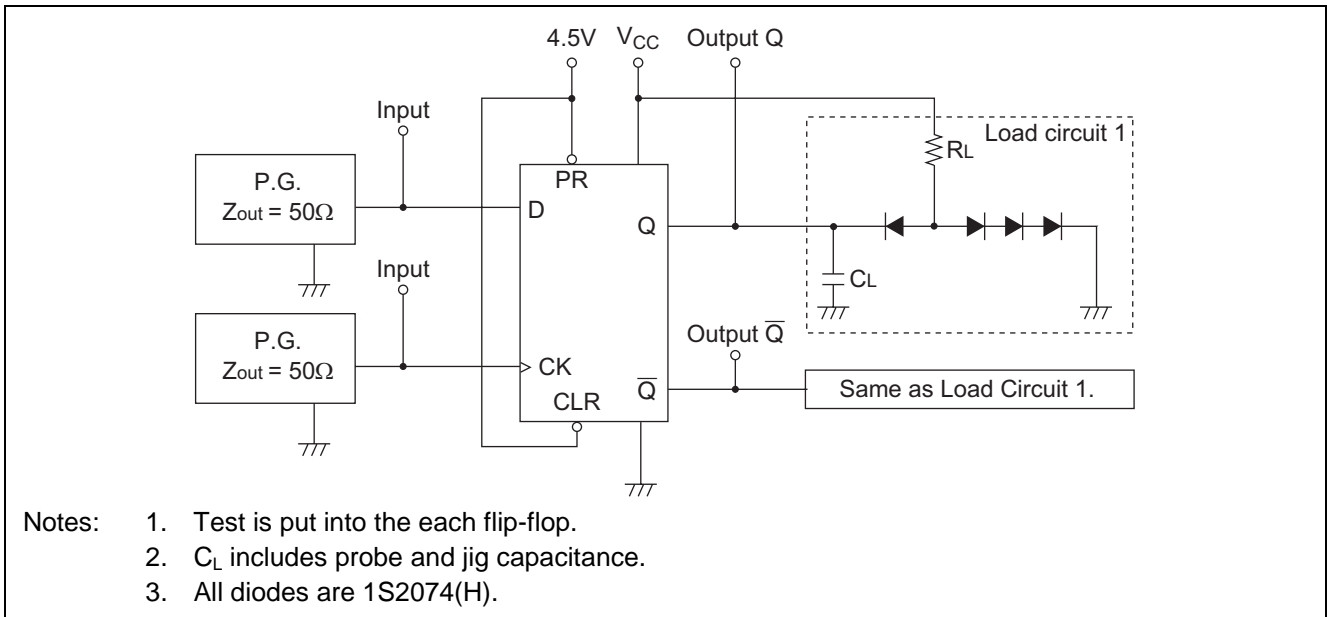
Timing Definition



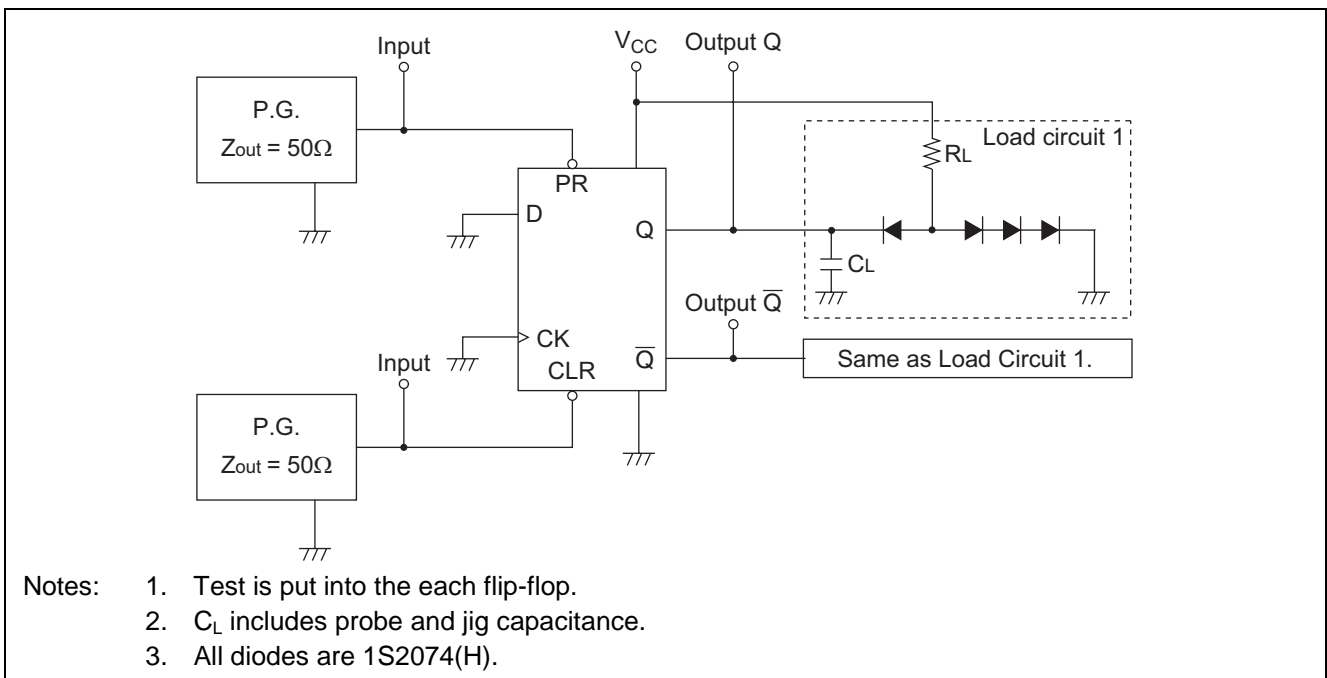
Testing Method

Test Circuit

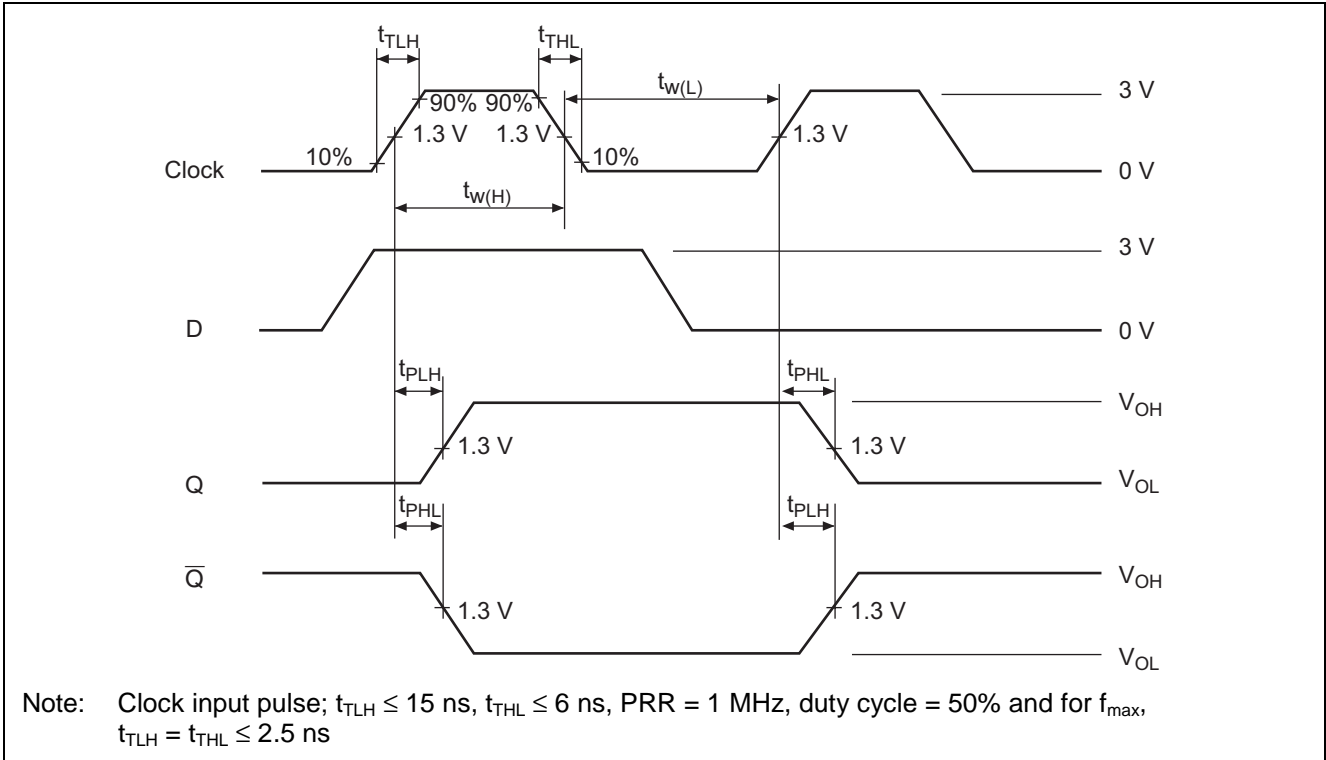
1. f_{max} , t_{PLH} , t_{PHL} (Clock \rightarrow Q, \bar{Q})



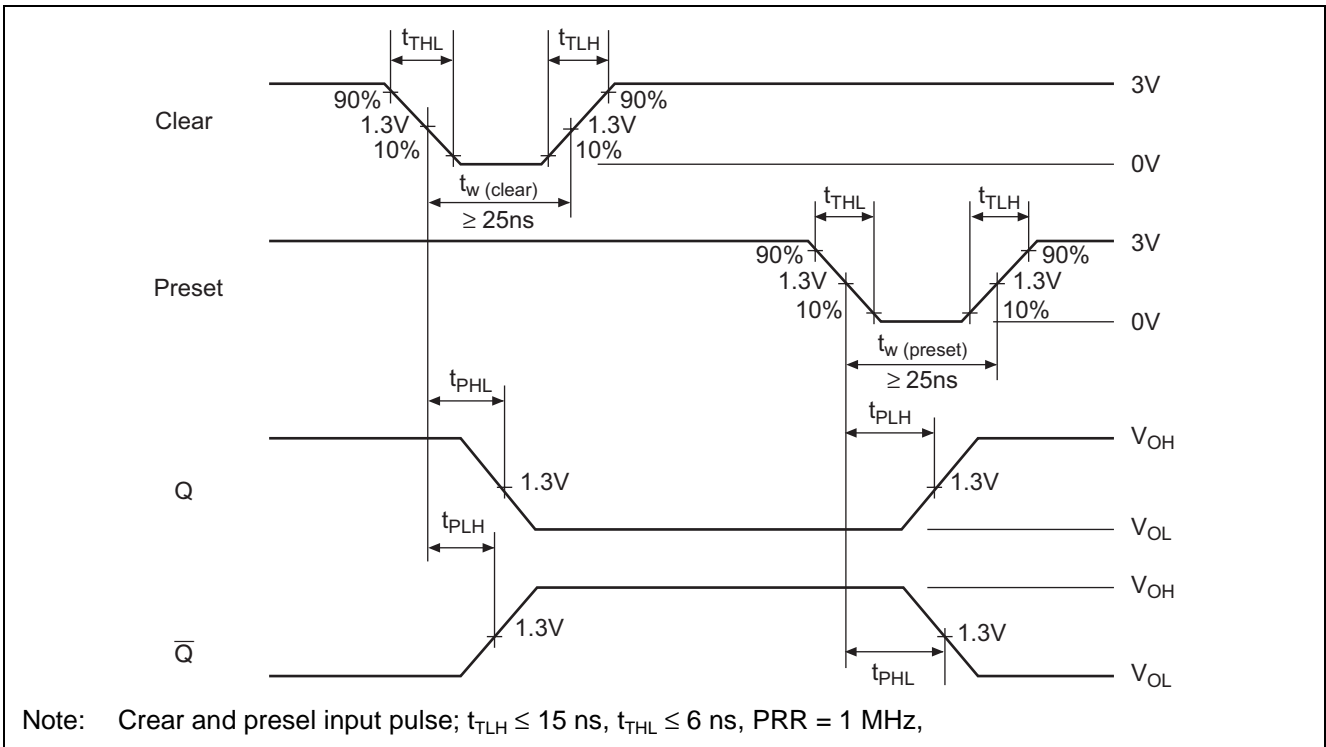
2. t_{PHL} , t_{PLH} (Clear or Preset \rightarrow Q, \bar{Q})



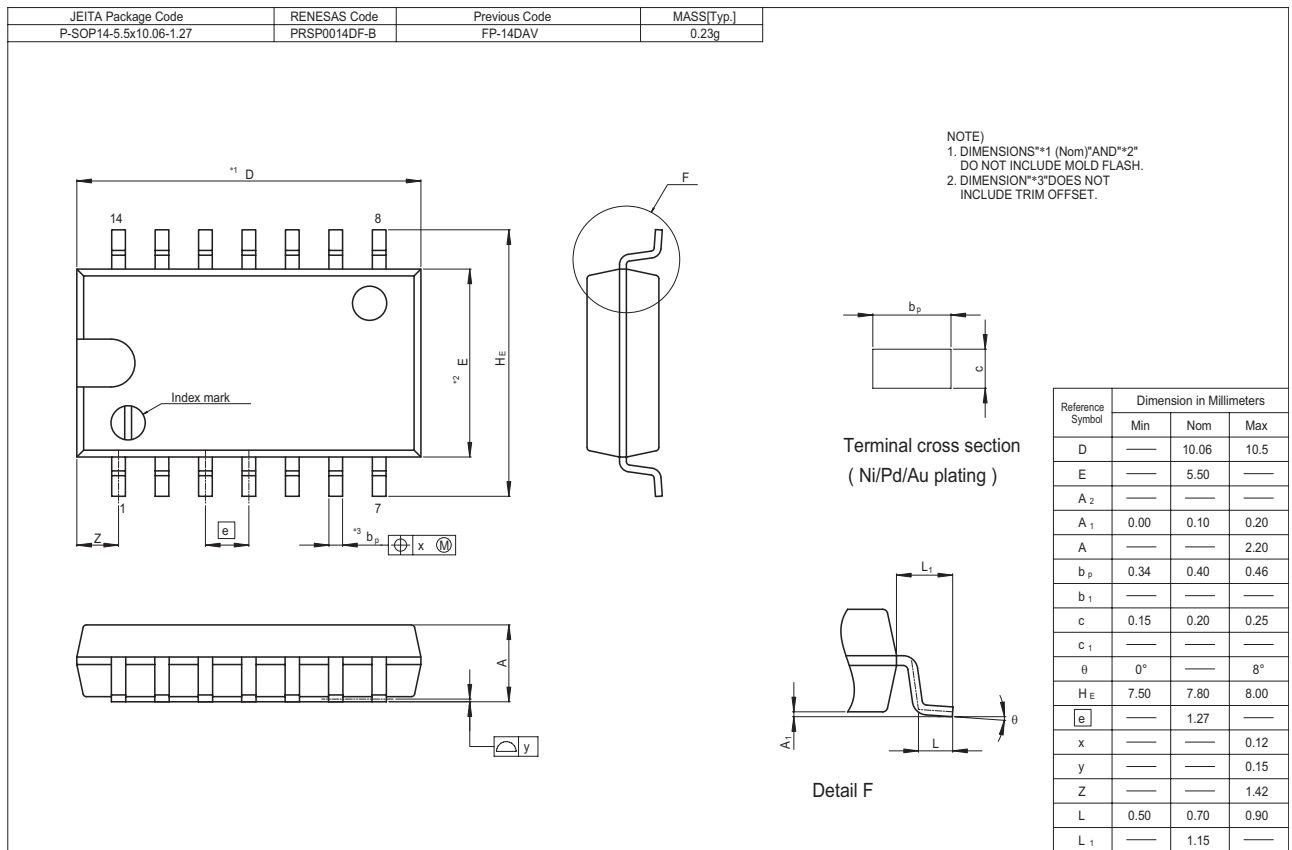
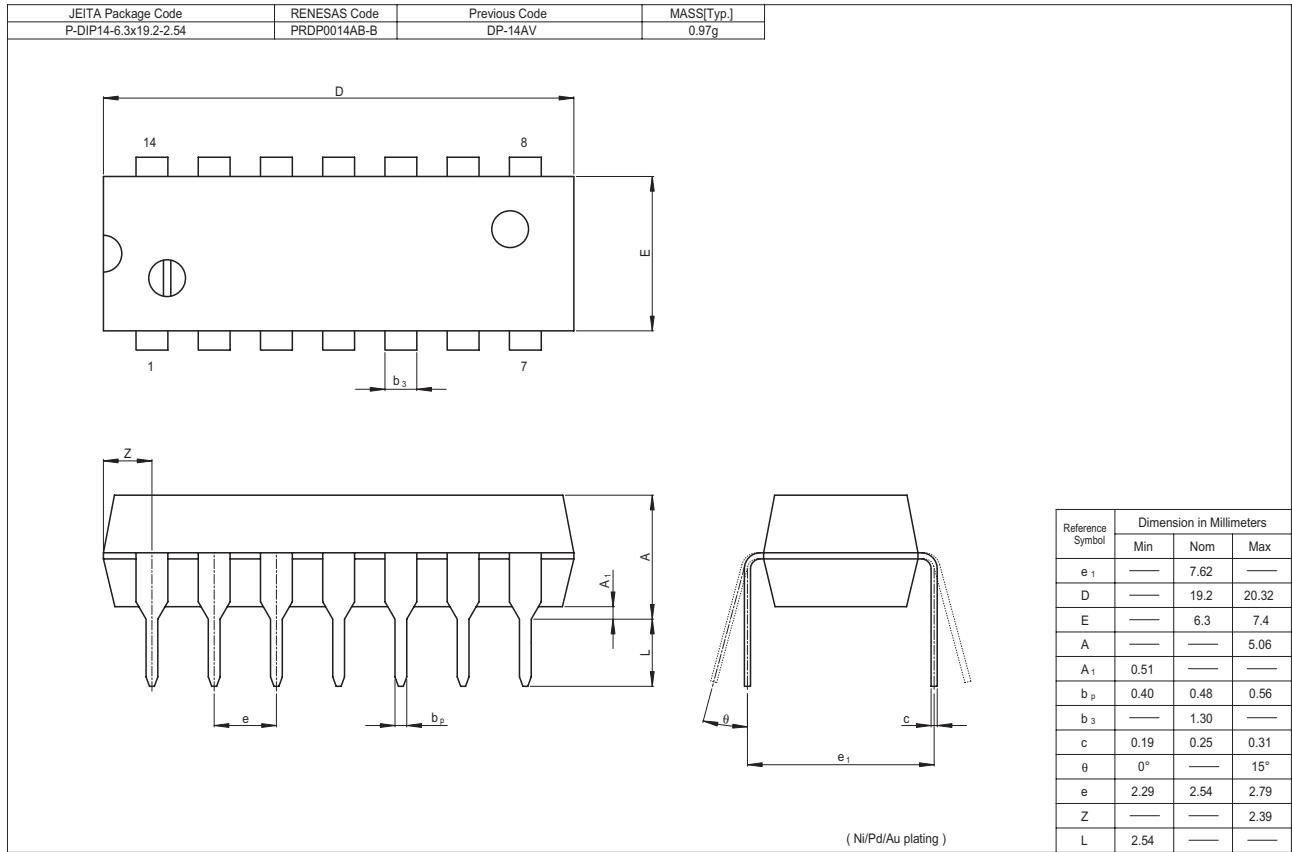
Waveforms 1



Waveforms 2

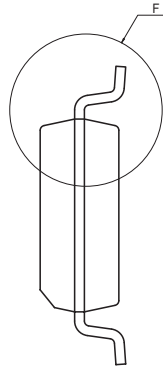
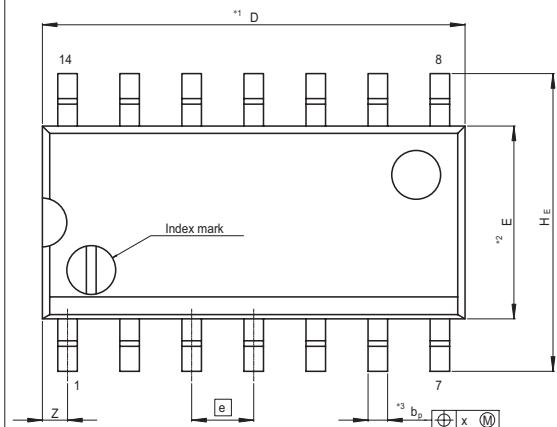


Package Dimensions

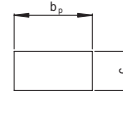


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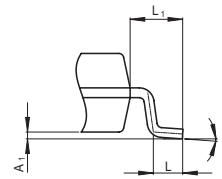
JEITA Package Code P-SOP14-3.95x8.65-1.27	RENESAS Code PRSP0014DE-A	Previous Code FP-14DNV	MASS[Typ.] 0.13g
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NOTE)
1. DIMENSIONS*1 (Nom)*AND*2*
DO NOT INCLUDE MOLD FLASH.
2. DIMENSION*3*DOES NOT
INCLUDE TRIM OFFSET.



Terminal cross section
(Ni/Pd/Au plating)



Detail F

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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