

HD74LS164

8-Bit Parallel-Out Serial-in Shift Register

REJ03D0448-0200

Rev.2.00

Feb.18.2005

This 8-bit shift register features gated serial inputs and an asynchronous clear. The gated serial inputs (A and B) permit complete control over incoming data as a low at either (or both) input(s) inhibits entry of the new data and resets the first flip-flop to the low level at the next clock pulse. A high-level input enables the other input which will then determine the state of the first flip-flop. Data at the serial inputs may be changed while the clock is high or low, but only information meeting the setup requirements will be entered. Clocking occurs on the low-to-high-level transition of the clock input.

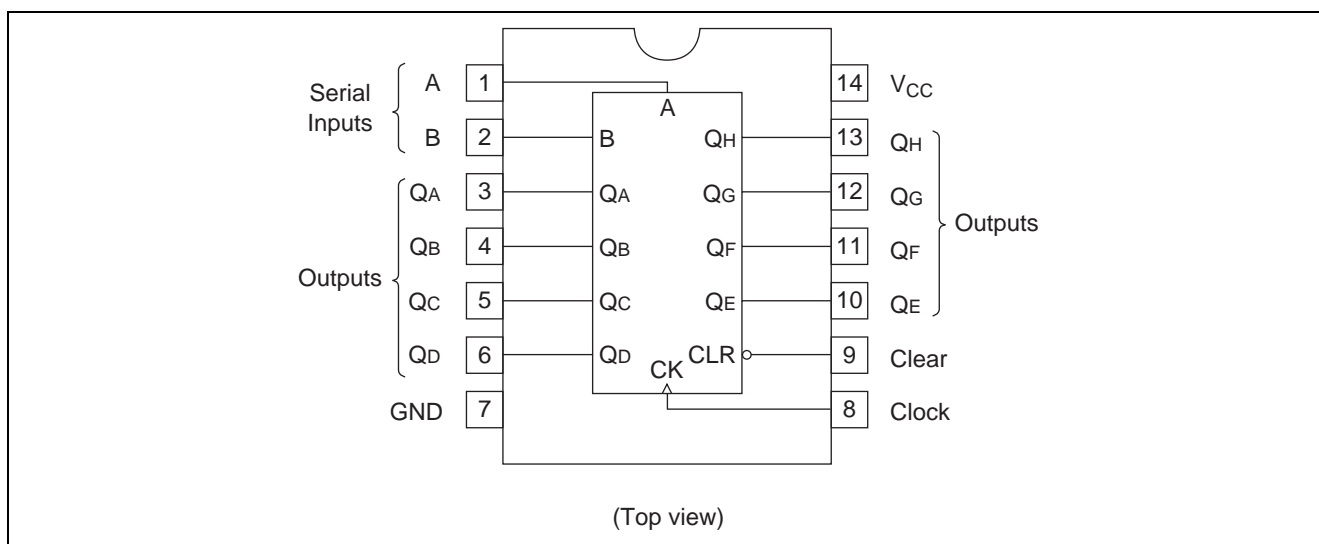
Features

- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LS164P	DILP-14 pin	PRDP0014AB-B (DP-14AV)	P	—
HD74LS164FPEL	SOP-14 pin (JEITA)	PRSP0014DF-B (FP-14DAV)	FP	EL (2,000 pcs/reel)
HD74LS164RPEL	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

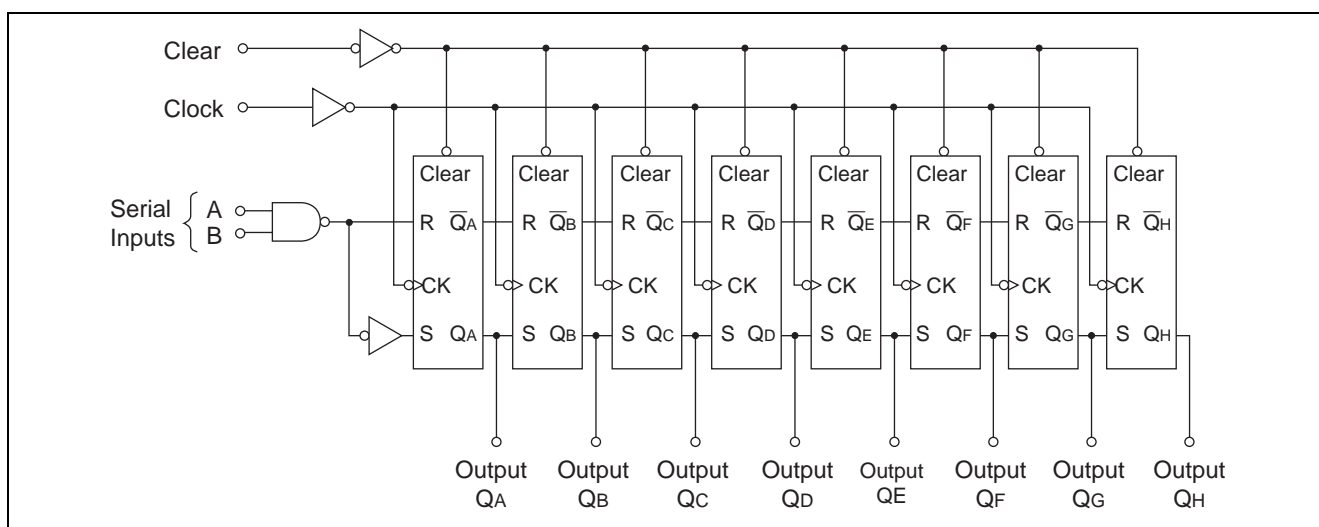


Function Table

Inputs				Outputs		
Clear	Clock	A	B	Q_A	Q_B, \dots, Q_H	
L	X	X	X	L	L	L
H	L	X	X	Q_{A0}	Q_{B0}	Q_{H0}
H	\uparrow	H	H	H	Q_{An}	Q_{Gn}
H	\uparrow	L	X	L	Q_{An}	Q_{Gn}
H	\uparrow	X	L	L	Q_{An}	Q_{Gn}

- Notes: 1. H; high level, L; low level, X; irrelevant
 2. \uparrow ; transition from low to high level
 3. Q_{A0} , Q_{B0} , Q_{H0} ; the level of Q_A , Q_B , or Q_H , respectively, before the indicated steady-state input conditions were established.
 4. Q_{An} , Q_{Gn} ; the level of Q_A or Q_G before the most-recent \uparrow transition of the clock; indicates a one-bit shift.

Block Diagram



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	$^{\circ}\text{C}$

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	$^{\circ}\text{C}$
Clock frequency	f_{clock}	0	—	25	MHz
Clock pulse width	$t_w (CK)$	20	—	—	ns
Clear pulse width	$t_w (CLR)$	20	—	—	ns
Data setup time	t_{su}	15	—	—	ns
Data hold time	t_h	5	—	—	ns

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}	—	—	0.4	V	V _{CC} = 4.75 V, V _{IH} = 2 V, V _{IL} = 0.8 V
		—	—	0.5		
Input current	I _{IH}	—	—	20	µA	V _{CC} = 5.25 V, V _I = 2.7 V
	I _{IL}	—	—	-0.4	mA	V _{CC} = 5.25 V, V _I = 0.4 V
	I _I	—	—	0.1	mA	V _{CC} = 5.25 V, V _I = 7 V
Short-circuit output current	I _{OS}	-20	—	-100	mA	V _{CC} = 5.25 V
Supply current**	I _{CC}	—	16	27	mA	V _{CC} = 5.25 V
Input clamp voltage	V _{IK}	—	—	-1.5	V	V _{CC} = 4.75 V, I _{IN} = -18 mA

Notes: * V_{CC} = 5 V, Ta = 25°C

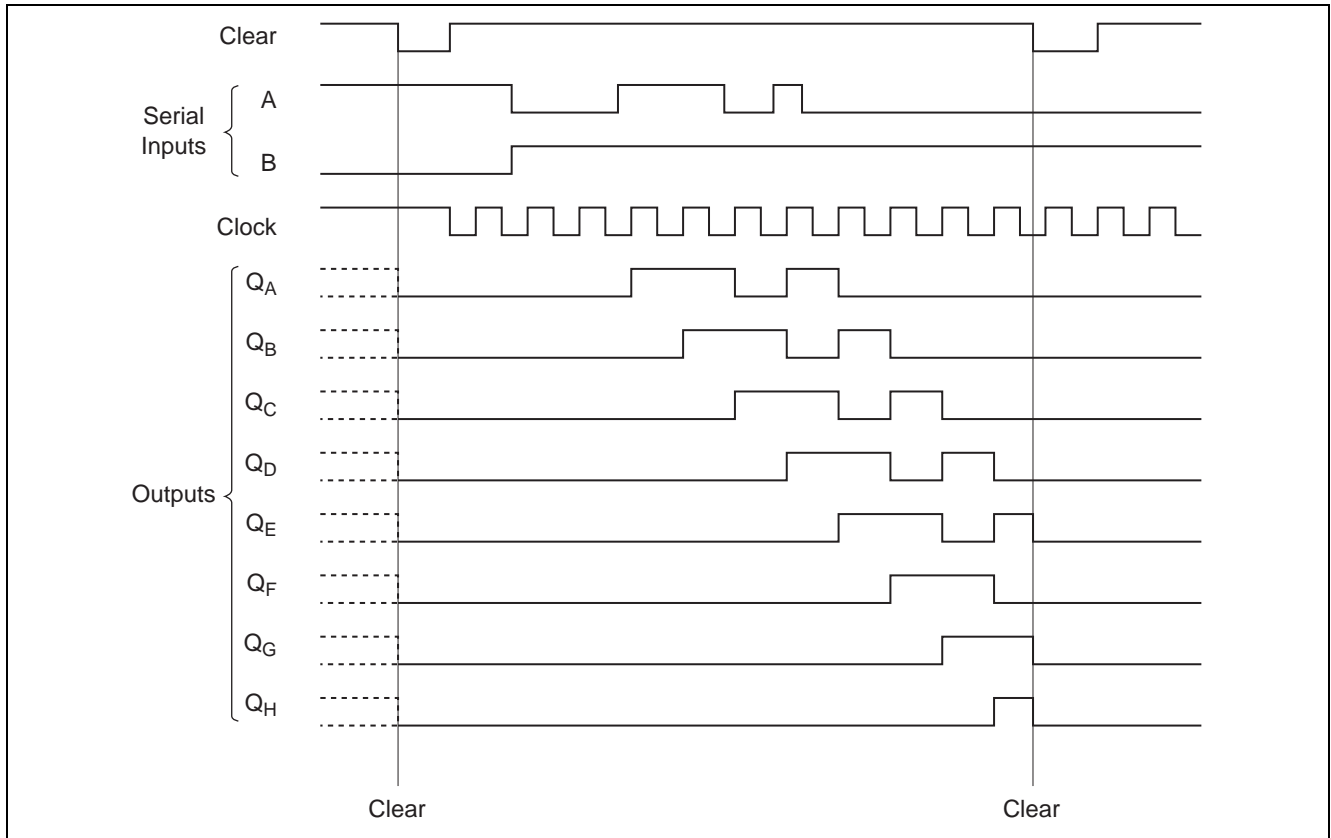
** I_{CC} is measured with outputs open, serial inputs grounded, the clock input at 2.4 V, and a momentary grounded, then 4.5 V applied to clear.

Switching Characteristics

(V_{CC} = 5 V, Ta = 25°C)

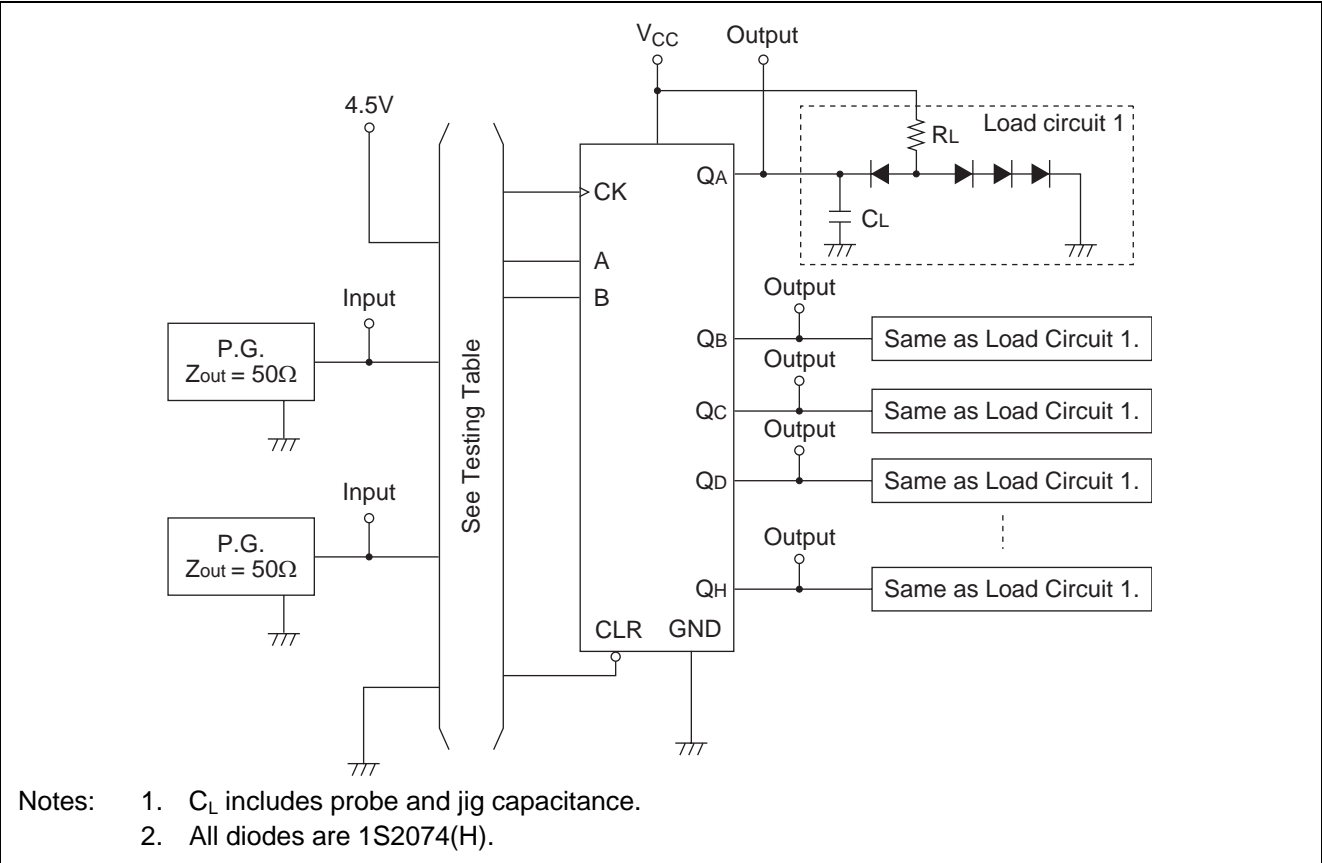
Item	Symbol	Inputs	Outputs	min.	typ.	max.	Unit	Condition
Maximum clock frequency	f _{max}			25	36	—	MHz	C _L = 15 pF, R _L = 2 kΩ
Propagation delay time	t _{PHL}	Clear	Q	—	24	36	ns	
	t _{PLH}	Clock	Q	—	17	27	ns	
	t _{PHL}	Clock	Q	—	21	32	ns	

Typical Clear, Shift, and Clear Sequences



Testing Method

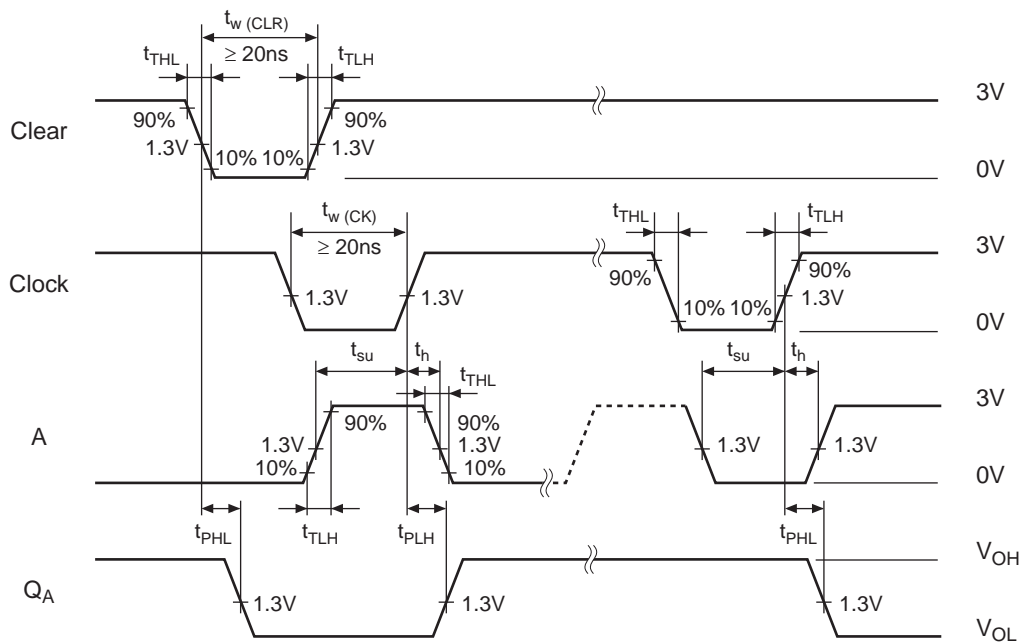
Test Circuit



Testing Table

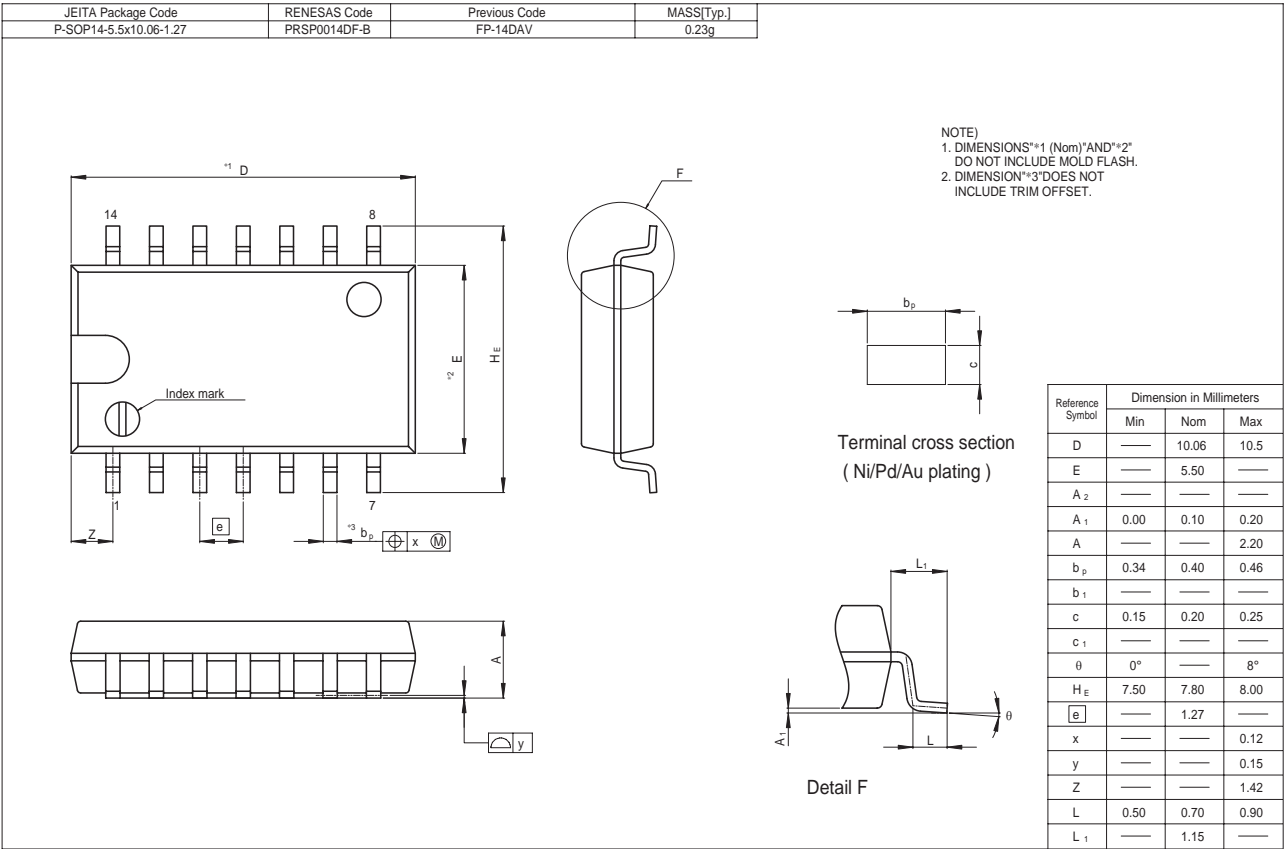
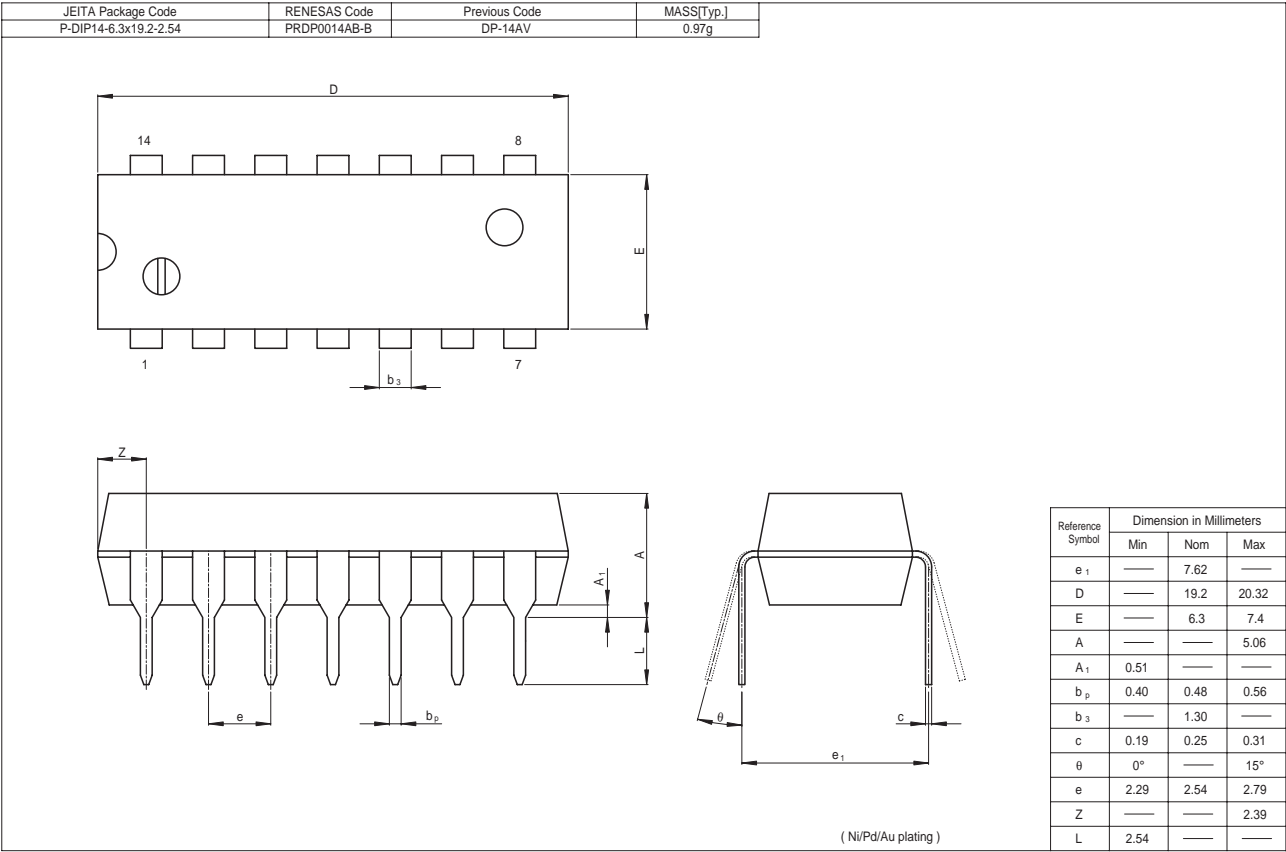
Item	From input to output	Inputs				Outputs							
		CLR	CK	A	B	Q _A	Q _B	Q _C	Q _D	Q _E	Q _F	Q _G	Q _H
f_{max}		4.5V	IN	IN	4.5V	OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT
t_{PLH}	Clear→Q	IN	IN	IN	4.5V	OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT
t_{PHL}	CK→Q	4.5V	IN	IN	4.5V	OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT

Waveform

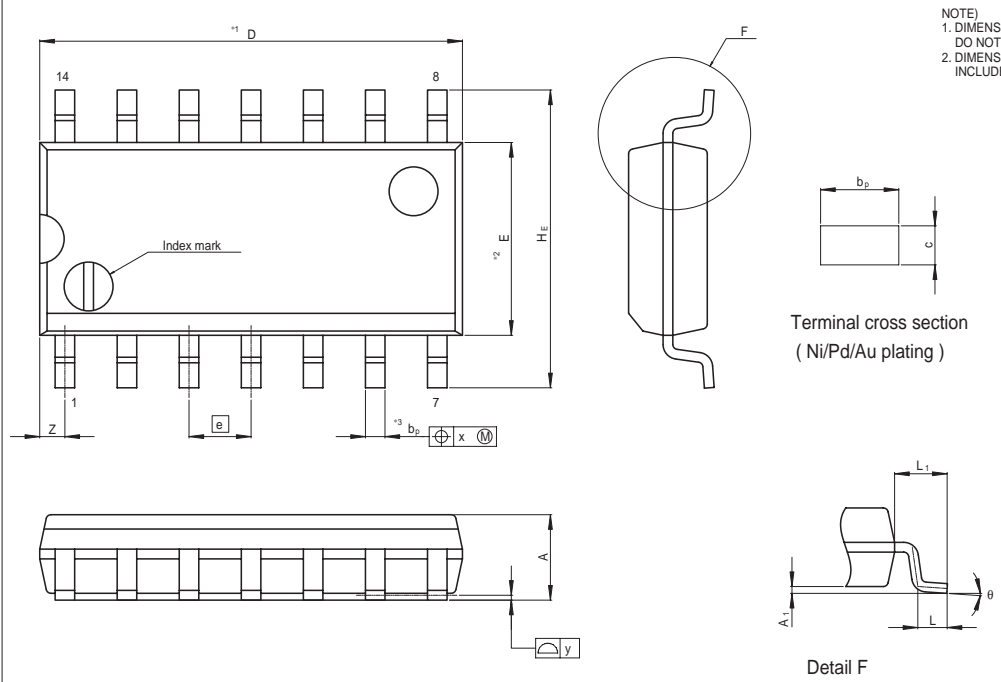


- Notes:
1. Input pulse; $t_{\text{TLH}} \leq 15\text{ ns}$, $t_{\text{THL}} \leq 6\text{ ns}$, PRR = 1 MHz, (Clock, Clear), PRR = 500 kHz (A or B)
 2. Q_A output is illustrated. Relationship of serial input A and B data to other Q outputs is illustrated in the timing chart.

Package Dimensions



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.

Terminal cross section
(Ni/Pd/Au plating)

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	—

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

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Renesas Technology America, Inc.

450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.

Unit2607 Ruijing Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.

1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001