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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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HD74HC95

4-bit Parallel Access Shift Register



ADE-205-431 (Z)
1st. Edition
Sep. 2000

Description

This 4-bit register features parallel and serial inputs, parallel outputs, mode control, and two clock inputs. The register has three mode operation:

- Parallel (broadside) load
- Shift right (the direction Q_A toward Q_D)
- Shift left (the direction Q_D toward Q_A)

Parallel loading is accomplished by applying the four bits of data and taking the mode control input high. The data is loaded into the associated flip-flops and appears at the outputs after the high-to-low transition of the clock-2 input. During loading, the entry of serial data is inhibited. Shift right is accomplished on the high-to-low transition of clock-1 when the mode control is low; shift left is accomplished on the high-to-low transition of clock-2 when the mode control is high by connecting the output of each flip-flop (Q_D to input C, etc.) and serial data is entered at input D. The clock input may be applied commonly to clock-1 and clock-2 if both modes can be clocked from the same source. Changes at the mode control input should normally be made while both clock inputs are low: however, conditions described in the last three lines of the function table will also ensure that register contents are protected.

Features

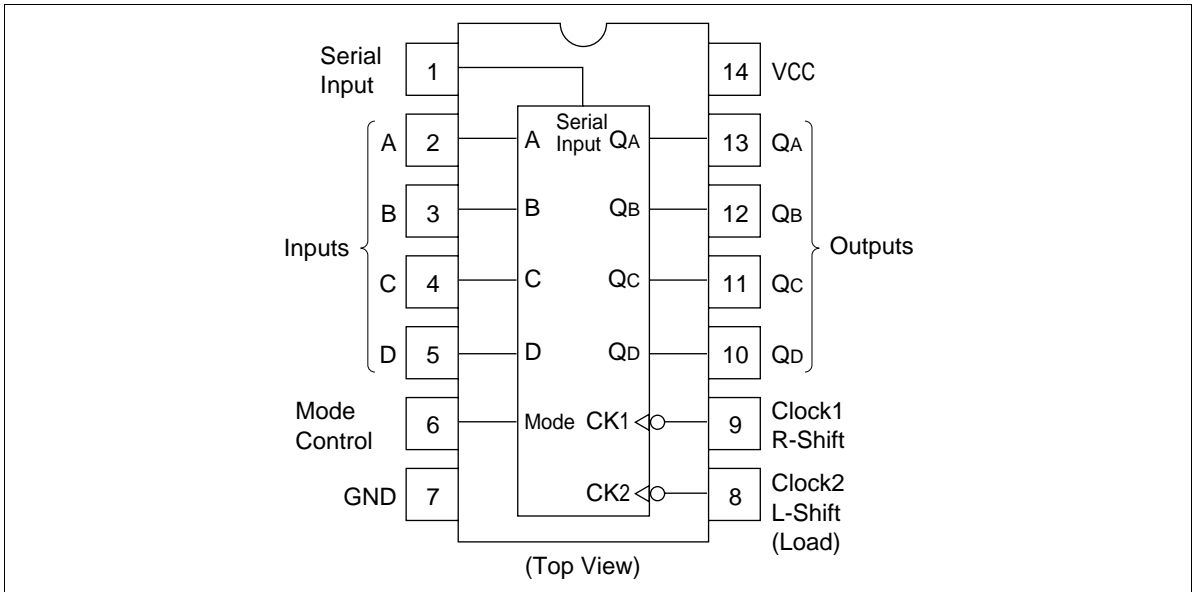
- High Speed Operation: t_{pd} (Clock to Q) = 17 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)

Function Table

Inputs

Mode	Clocks		Serial	Parallel				Outputs			
	Control	2 (L)		1 (R)	A	B	C	D	Q _A	Q _B	Q _C
H	H	X	X	X	X	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}
H		X	X	a	b	c	d	a	b	c	d
H		X	X	Q _{B+}	Q _{C+}	Q _{D+}	d	Q _{Bn}	Q _{Cn}	Q _{Dn}	d
L	L	H	X	X	X	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}
L	X		H	X	X	X	X	H	Q _{An}	Q _{Bn}	Q _{Cn}
L	X		L	X	X	X	X	L	Q _{An}	Q _{Bn}	Q _{Cn}
	L	L	X	X	X	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}
	L	L	X	X	X	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}
	L	H	X	X	X	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}
	H	L	X	X	X	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}
	H	H	X	X	X	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}

Pin Arrangement



DC Characteristics

Item	Symbol	V _{CC} (V)	Ta = 25°C		Ta = -40 to +85°C		Unit	Test Conditions		
			Min	Typ	Max	Min			Max	
Input voltage	V _{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V _{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V _{OH}	2.0	1.9	2.0	—	1.9	—	V	Vin = V _{IH} or V _{IL} I _{OH} = -20 μA	
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	—	—	4.13	—			I _{OH} = -4 mA
		6.0	5.68	—	—	5.63	—			I _{OH} = -5.2 mA
	V _{OL}	2.0	—	0.0	0.1	—	0.1	V	Vin = V _{IH} or V _{IL} I _{OL} = 20 μA	
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	—	0.26	—	0.33			I _{OL} = 4 mA
		6.0	—	—	0.26	—	0.33			I _{OL} = 5.2 mA
Input current	I _{in}	6.0	—	—	±0.1	—	±1.0	μA	Vin = V _{CC} or GND	
Quiescent supply current	I _{CC}	6.0	—	—	4.0	—	40	μA	Vin = V _{CC} or GND, I _{out} = 0 μA	

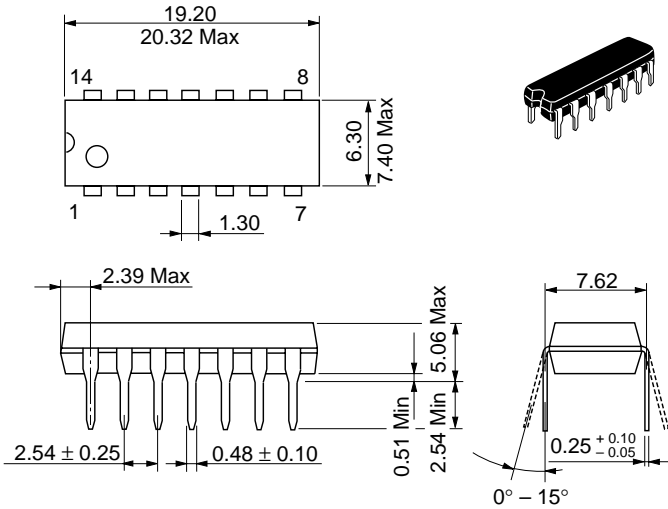
HD74HC95

AC Characteristics ($C_L = 50$ pF, Input $t_r = t_f = 6$ ns)

Item	Symbol	V_{CC} (V)	$T_a = 25^\circ\text{C}$		$T_a = -40$ to $+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min			Max
Maximum clock frequency	f_{max}	2.0	—	—	4	—	3	MHz	
		4.5	—	—	20	—	16		
		6.0	—	—	24	—	19		
Propagation delay time	t_{PLH}	2.0	—	—	145	—	180	ns	
		4.5	—	17	29	—	36		
		6.0	—	—	25	—	31		
	t_{PHL}	2.0	—	—	170	—	215	ns	
		4.5	—	17	34	—	43		
		6.0	—	—	29	—	37		
Pulse width	t_w	2.0	80	—	—	100	—	ns	Clock
		4.5	16	6	—	20	—		
		6.0	14	—	—	17	—		
Setup time	t_{su}	2.0	100	—	—	125	—	ns	
		4.5	20	2	—	25	—		
		6.0	17	—	—	21	—		
Hold time	t_h	2.0	10	—	—	10	—	ns	
		4.5	10	-1	—	10	—		
		6.0	10	—	—	10	—		
Output rise/fall time	t_{TLH}	2.0	—	—	75	—	95	ns	
	t_{THL}	4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	C_{in}	—	—	5	10	—	10	pF	

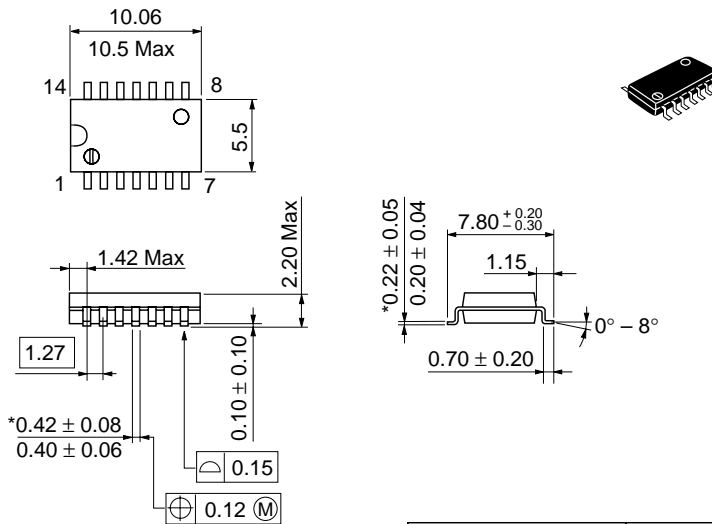
Package Dimensions

Unit: mm



Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.97 g

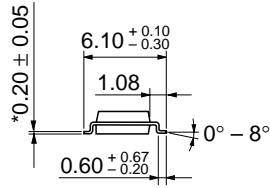
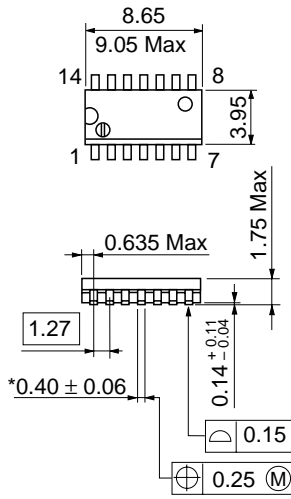
Unit: mm



Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.23 g

*Dimension including the plating thickness
Base material dimension

Unit: mm



*Pd plating

Hitachi Code	FP-14DN
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.13 g

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