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

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Keep safety first in your circuit designs!

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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HD74HC323

8-bit Universal Shift/Storage Register (with 3-state Outputs)



ADE-205-489 (Z)
1st. Edition
Sep. 2000

Description

This eight-bit universal register features multiplexed I/O ports to achieve full eight bit data handling in a single 20-pin package. HD74HC323 applications are as stacked or push-down registers, buffer storage, and accumulator registers.

Two function-select inputs and two output control inputs can be used to choose the modes of operation listed in the function table.

Synchronous parallel loading is accomplished by taking both function-select lines S_0 and S_1 high. This places the three-state outputs in a high-impedance state, which permits data that is applied on the I/O ports to be clocked into the register. Reading out of this register can be accomplished while the outputs are enabled in any mode. The clear function is synchronous, and a low level at the clear input clears the register on the next low-to-high transition of the clock.

Features

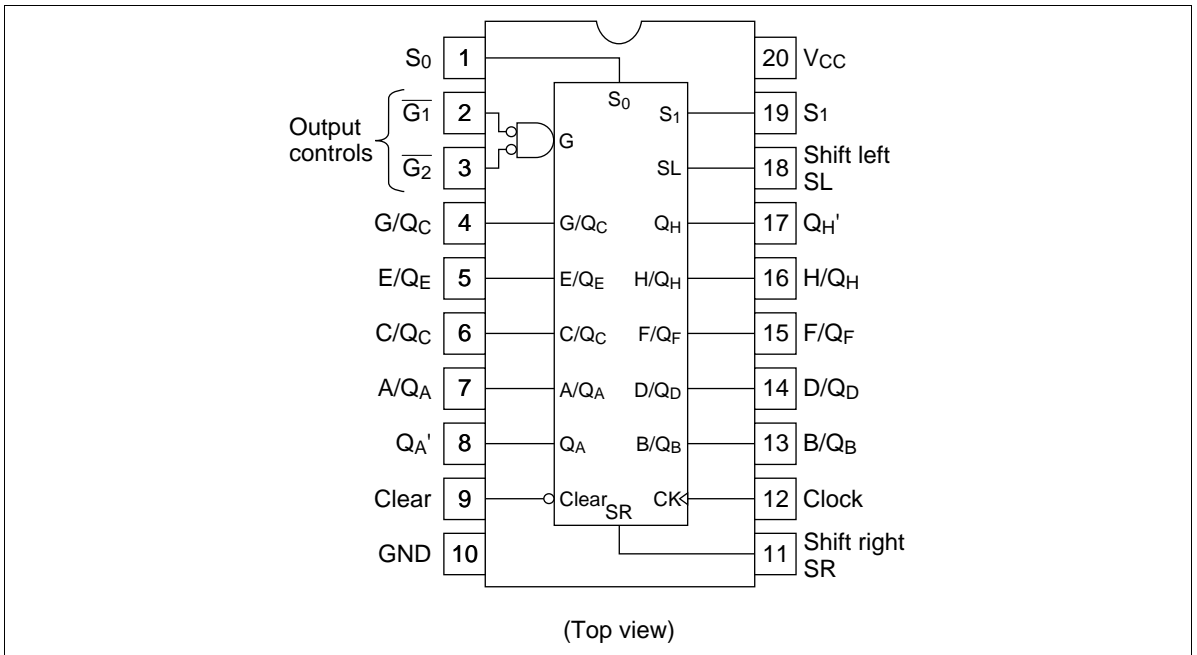
- High Speed Operation: t_{pd} (Clock to Q) = 20 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)

Function Table

Inputs		Serial Inputs/Outputs																Outputs	
		Function Select		Output Control		Clock	S _L	S _R	A/Q _A	B/Q _B	C/Q _C	D/Q _D	E/Q _E	F/Q _F	G/Q _G	H/Q _H	Q _A '		
Mode	Clear	S ₁	S ₀	$\overline{G}_1\uparrow$	$\overline{G}_2\uparrow$														
Clear	L	X	L	L	L		X	X	L	L	L	L	L	L	L	L	L	L	
	L	L	X	L	L		X	X	L	L	L	L	L	L	L	L	L	L	
Hold	H	L	L	L	L	X	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}	Q _{E0}	Q _{F0}	Q _{G0}	Q _{H0}	Q _{A0}	Q _{H0}	
	H	X	X	L	L	L	X	X	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}	Q _{E0}	Q _{F0}	Q _{G0}	Q _{H0}	Q _{A0}	Q _{H0}	
Shift	H	L	H	L	L		X	H	H	Q _{An}	Q _{Bn}	Q _{Cn}	Q _{Dn}	Q _{En}	Q _{Fn}	Q _{Gn}	H	Q _{Gn}	
Right	H	L	H	L	L		X	L	L	Q _{An}	Q _{Bn}	Q _{Cn}	Q _{Dn}	Q _{En}	Q _{Fn}	Q _{Gn}	L	Q _{Gn}	
Shift	H	H	L	L	L		H	X	Q _{Bn}	Q _{Cn}	Q _{Dn}	Q _{En}	Q _{Fn}	Q _{Gn}	Q _{Hn}	H	Q _{Bn}	H	
Left	H	H	L	L	L		L	X	Q _{Bn}	Q _{Cn}	Q _{Dn}	Q _{En}	Q _{Fn}	Q _{Gn}	Q _{Hn}	L	Q _{Bn}	L	
Load	H	H	H	X	X		X	X	a	b	c	d	e	f	g	h	a	h	

a ... h = the level of the steady-state input at A through H, respectively. These data are loaded into the flip-flops while the flip-flop outputs are isolated from the input/output terminals.

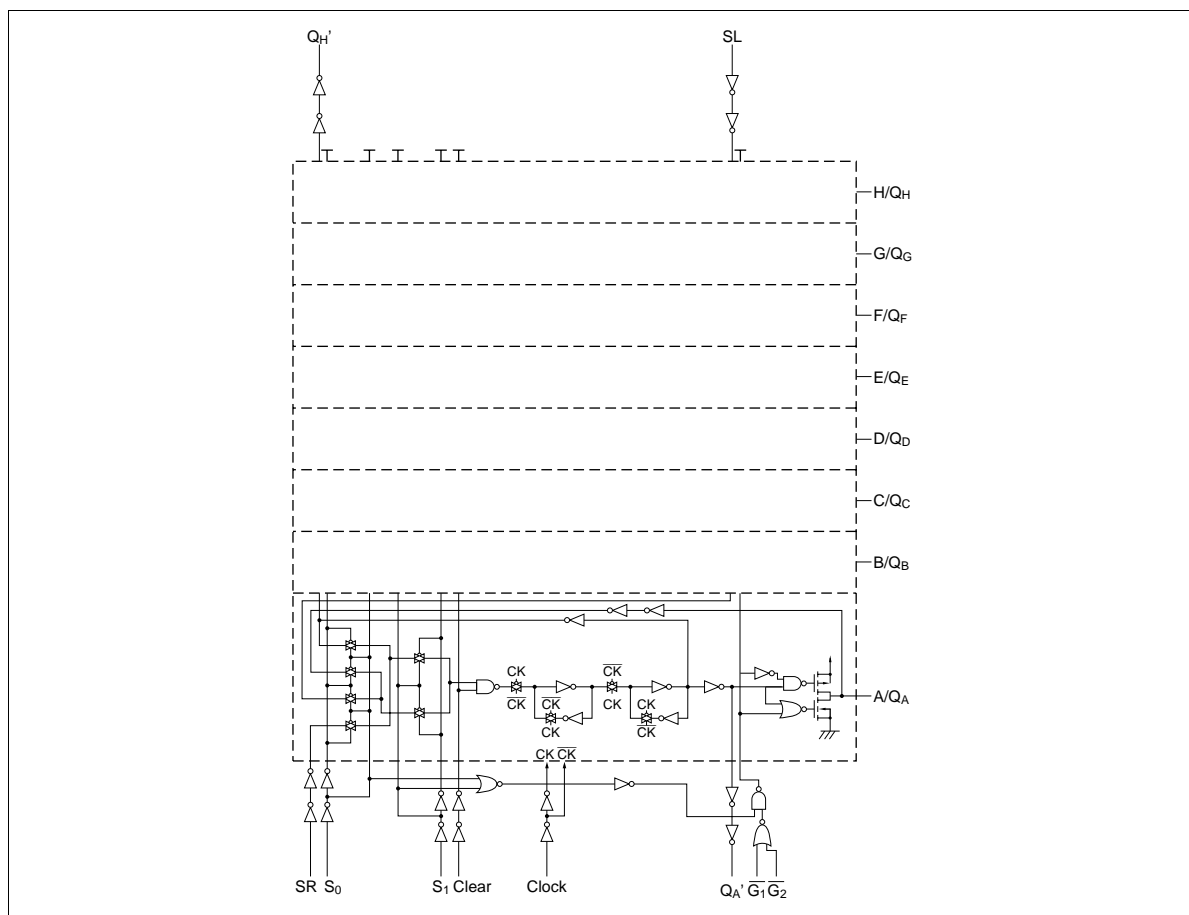
Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to +7.0	V
Input voltage	V_{IN}	-0.5 to $V_{CC} + 0.5$	V
Output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Output current	I_{OUT}	± 35	mA
DC current drain per V_{CC} , GND	I_{CC} , I_{GND}	± 75	mA
DC input diode current	I_{IK}	± 20	mA
DC output diode current	I_{OK}	± 20	mA
Power dissipation per package	P_T	500	mW
Storage temperature	T_{stg}	-65 to +150	$^{\circ}C$

Logic Diagram



DC Characteristics

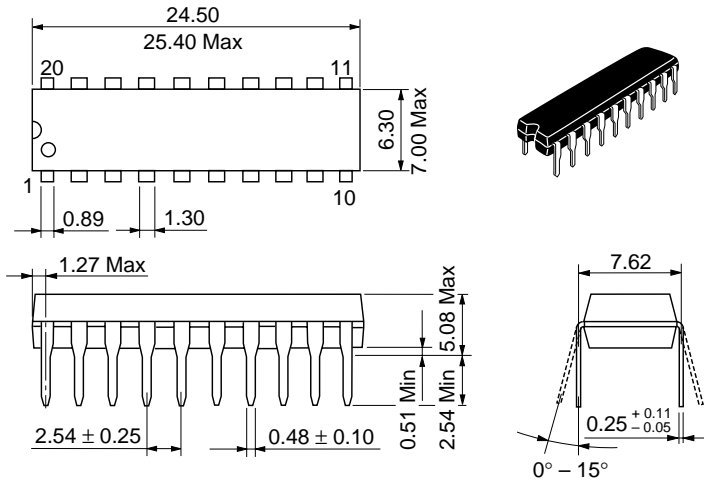
Item	Symbol	V _{CC} (V)	Ta = 25°C		Ta = -40 to +85°C		Unit	Test Conditions				
			Min	Typ	Max	Min			Max			
Input voltage	V _{IH}	2.0	1.5	—	—	1.5	—	V				
		4.5	3.15	—	—	3.15	—					
		6.0	4.2	—	—	4.2	—					
	V _{IL}	2.0	—	—	0.5	—	0.5	V				
		4.5	—	—	1.35	—	1.35					
		6.0	—	—	1.8	—	1.8					
Output voltage	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	—				Q _A to Q _H	I _{OH} = -6 mA
		6.0	5.68	—	—	5.63	—					I _{OH} = -7.8 mA
		4.5	4.18	—	—	4.13	—				Q _A ' , Q _H '	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				Q _A to Q _H	I _{OH} = 6 mA
		6.0	—	—	0.26	—	0.33					I _{OH} = 7.8 mA
4.5		—	—	0.26	—	0.33	Q _A ' , Q _H '				I _{OH} = 4 mA	
6.0	—	—	0.26	—	0.33	I _{OH} = 5.2 mA						
Off-state output current	I _{OZ}	6.0	—	—	±0.5	—	±5.0	μA	Vin = V _{IH} or V _{IL} , Vout = V _{CC} or GND			
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			

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	—	—	5	—	4	MHz	
		4.5	—	—	27	—	21		
		6.0	—	—	31	—	24		
Propagation delay time	t_{PLH}	2.0	—	—	150	—	190	ns	Clock to Q_A' or Q_H'
		4.5	—	18	30	—	38		
		6.0	—	—	26	—	33		
	t_{PHL}	2.0	—	—	175	—	220	ns	Clock to Q
		4.5	—	20	35	—	44		
		6.0	—	—	30	—	37		
Output enable time	t_{ZH}	2.0	—	—	150	—	190	ns	
		4.5	—	14	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	t_{ZL}	2.0	—	—	150	—	190	ns	
		4.5	—	15	30	—	38		
		6.0	—	—	26	—	33		
Output rise/fall time	t_{TLH}	2.0	—	—	75	—	95	ns	Q_A', Q_H'
		4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
	t_{THL}	2.0	—	—	60	—	75	ns	Q
		4.5	—	4	12	—	15		
		6.0	—	—	10	—	13		
Input capacitance	C_{in}	—	—	5	10	—	10	pF	

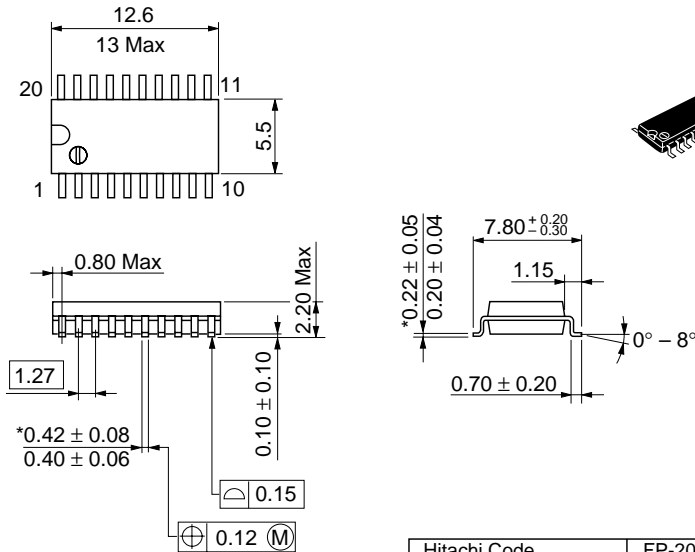
Package Dimensions

Unit: mm



Hitachi Code	DP-20N
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.26 g

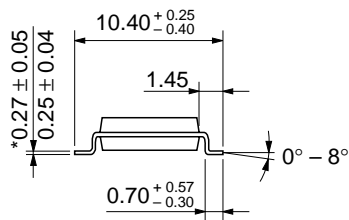
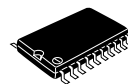
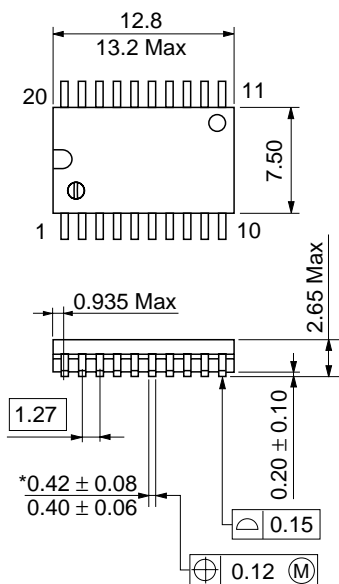
Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-20DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.31 g

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-20DB
JEDEC	Conforms
EIAJ	—
Mass (reference value)	0.52 g

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