
HD74HC595

8-bit Shift Register/Latch (with 3-state outputs)

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Description



This device each contains an 8-bit serial-in, parallel-out shift register that feeds an 8-bit D-type storage register. The storage register has parallel 3-state outputs. Separate clocks are provided for both the shift register and the storage register. The shift register has a direct-overriding clear, serial input, and serial output pins for cascading.

Both the shift register and storage register clocks are positive-edge triggered. If the user wishes to connect both clocks together, the shift register state will always be one clock pulse ahead of the storage register.

Features

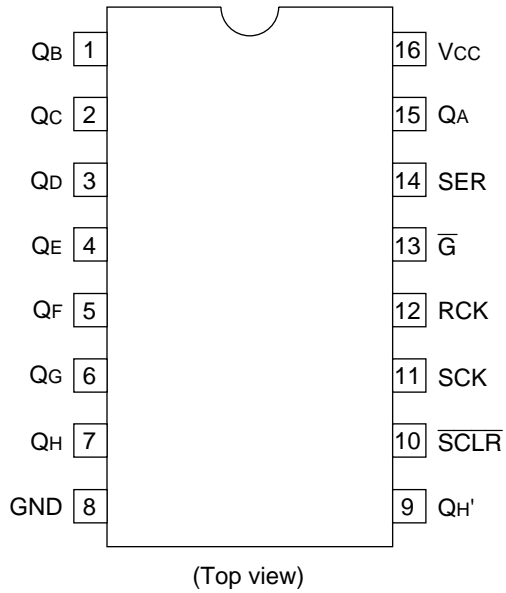
- High Speed Operation: t_{pd} (RCK to Q) = 17 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 15 LSTTL Loads (Q_A to Q_H outputs)
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)

Function Table

RCK	SCK	$\overline{\text{SCLR}}$	$\overline{\text{G}}$	Function
X	X	X	H	Q_A to Q_H high impedance
X	X	L	X	Shift register cleared $Q_H' = L$
X		H	X	Shift register clocked $Q_n = Q_{n-1}$, $Q_A = \text{SER}$
	X	H	X	Contents of shift register transferred to output latches

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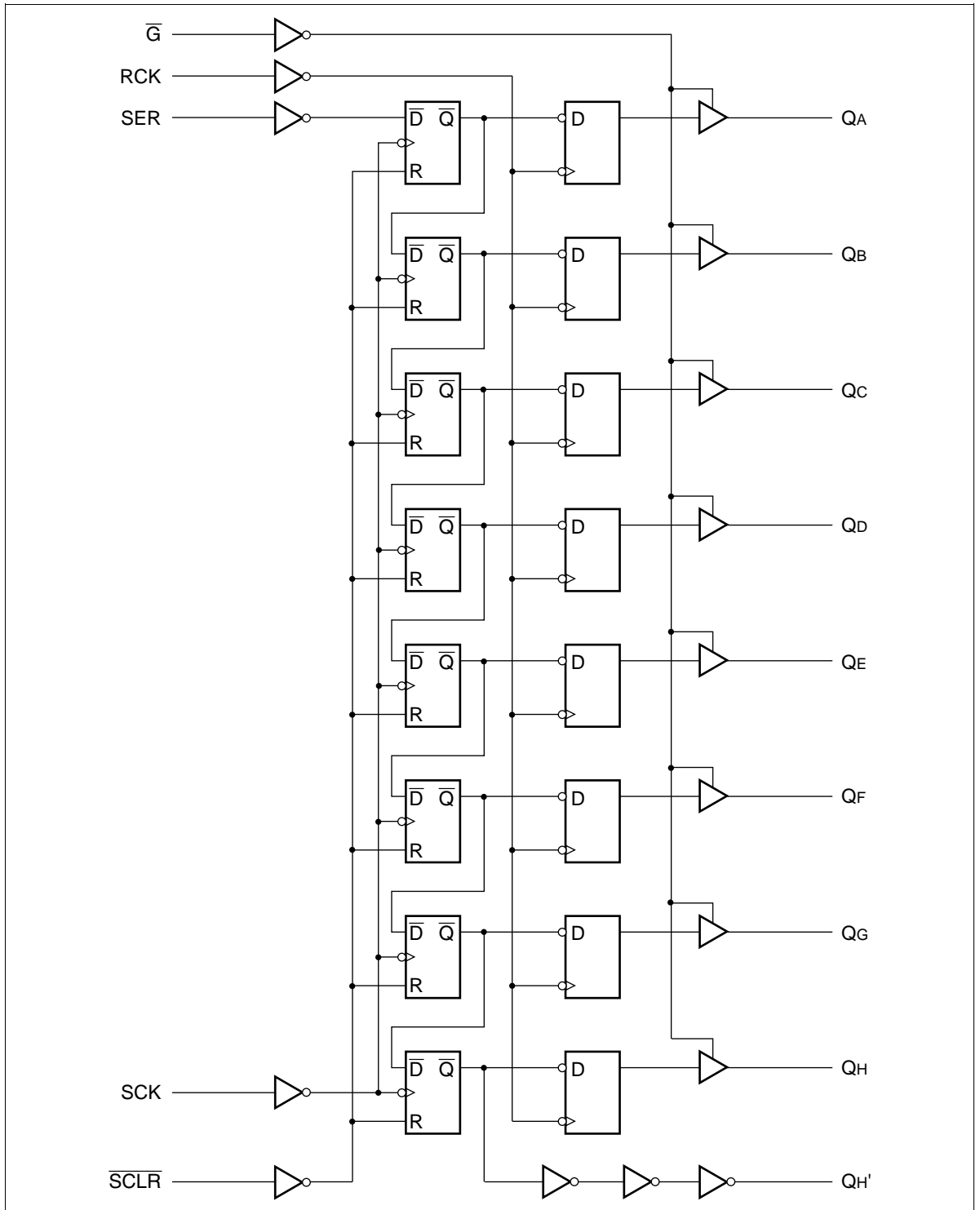
Pin Arrangement



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



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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		Q _A to Q _H V _{in} = 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} = -6 mA		
		6.0	5.68	—	—	5.63	—		I _{OH} = -7.8 mA		
		6.0	—	0.0	0.1	—	0.1		V		
	4.5	—	0.0	0.1	—	0.1					
	6.0	—	0.0	0.1	—	0.1					
	4.5	—	—	0.26	—	0.33	I _{OL} = 6 mA				
	6.0	—	—	0.26	—	0.33	I _{OL} = 7.8 mA				
	6.0	—	—	0.26	—	0.33	I _{OL} = 7.8 mA				
	Output voltage	V _{OH}	2.0	1.9	2.0	—	1.9	—	V	Q' _H V _{in} = 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			
6.0			—	0.0	0.1	—	0.1	V			
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				
6.0		—	—	0.26	—	0.33	I _{OL} = 5.2 mA				
Off-state output current		I _{OZ}	6.0	—	—	±0.5	—	±5.0	μA	V _{in} = V _{IH} or V _{IL} , V _{out} = V _{CC} or GND	
Input current	I _{in}	6.0	—	—	±0.1	—	±1.0	μA	V _{in} = V _{CC} or GND		
Quiescent supply current	I _{CC}	6.0	—	—	4.0	—	40	μA	V _{in} = V _{CC} or GND, I _{out} = 0 μA		

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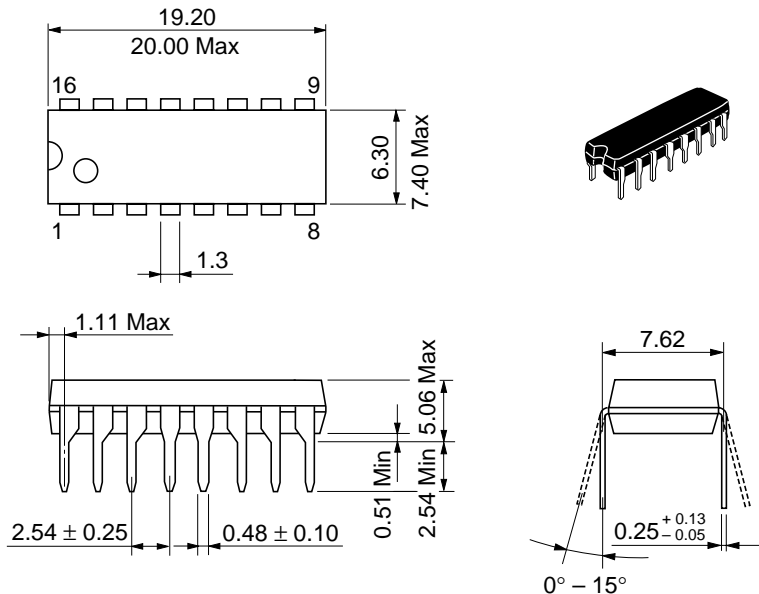
AC Characteristics ($C_L = 50$ pF, Input $t_r = t_f = 6$ ns)

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	—	—	115	—	145	ns	SCK to Q_H'
		4.5	—	12	23	—	29		
		6.0	—	—	20	—	25		
	t_{PHL}	2.0	—	—	150	—	190	ns	RCK to Q
		4.5	—	17	30	—	38		
		6.0	—	—	26	—	33		
t_{PLH}	2.0	—	—	175	—	220	ns	$\overline{\text{SCLR}}$ to Q_H'	
	4.5	—	20	35	—	44			
	6.0	—	—	30	—	37			
Output enable time	t_{ZL}	2.0	—	—	150	—	190	ns	
		4.5	—	13	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	t_{ZH}	2.0	—	—	150	—	190	ns	
		4.5	—	15	30	—	38		
		6.0	—	—	26	—	33		
Setup time	t_{su}	2.0	100	—	—	125	—	ns	SER to SCK
		4.5	20	1	—	25	—		
		6.0	17	—	—	21	—		
	t_{su}	2.0	200	—	—	250	—	ns	SCK to RCK
		4.5	40	8	—	50	—		
		6.0	34	—	—	43	—		
Pulse width	t_w	2.0	80	—	—	100	—	ns	
		4.5	16	8	—	20	—		
		6.0	14	—	—	17	—		
Removal time	t_{rem}	2.0	100	—	—	125	—	ns	
		4.5	20	—	—	25	—		
		6.0	17	—	—	21	—		

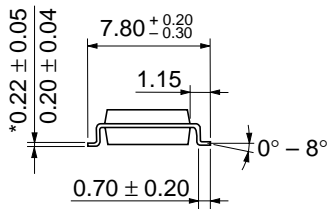
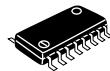
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AC Characteristics ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$) (cont)

Item	Symbol	V_{CC} (V)	Ta = 25°C		Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min			Max
Hold time	t_h	2.0	5	—	—	5	—	ns	
		4.5	5	1	—	5	—		
		6.0	5	—	—	5	—		
Output rise/fall time	t_{TLH}	2.0	—	—	75	—	95	ns	Q_H'
	t_{THL}	4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
		2.0	—	—	60	—	75	ns	Q
	4.5	—	4	12	—	15			
	6.0	—	—	10	—	13			
Input capacitance	C_{in}	—	—	5	10	—	5	pF	



Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



*Dimension including the plating thickness
 Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g

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Hitachi, Ltd.

Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

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For further information write to:

Hitachi Semiconductor
(America) Inc.
179 East Tasman Drive,
San Jose, CA 95134
Tel: <1> (408) 433-1990
Fax: <1>(408) 433-0223

Hitachi Europe GmbH
Electronic components Group
Dornacher Straße 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 778322

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3F, Hung Kuo Building, No.167,
Tun-Hwa North Road, Taipei (105)
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower, World Finance Centre,
Harbour City, Canton Road, Tsim Sha Tsui,
Kowloon, Hong Kong
Tel: <852> (2) 735 9218
Fax: <852> (2) 730 0281
Telex: 40815 HITEC HX

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