HD74HC165

Parallel-load 8-bit Shift Register

HITACHI

Description

This 8-bit serial shift register shifts data from Q_A to Q_H when clocked. Parallel inputs to each stage are enabled by a low level at the Shift/Load input. Also included is a gated clock input and a complementary output from the eighth bit.

Clocking is accomplished through a 2-input NOR gate permitting one input to be used as a clock inhibit function. Holding either of the clock inputs high inhibits clocking, and holding either clock input low with the Shift/Load input high enables the other clock input. Data transfer occurs on the positive going edge of the clock. Parallel loading is inhibited as long as the Shift/Load input is high. When taken low, data at the parallel inputs is loaded directly into the register independent of the state of the clock.

Features

- High Speed Operation: t_{pd} (Clock to Q_H) = 21 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 µA max
- Low Quiescent Supply Current: I_{CC} (static) = 4 µA max (Ta = 25°C)

Function Table

Inputs

				Parallel	**Internal outputs**		**Output**
Shift/Load	**Clock Inhibit**	**Clock**	**Serial**	**A ····· H**	**Q_A**	**Q_B**	**Q_H**
L	X	X	X	a ·····h	a	b	h
H	L	L	X	X	Q_{A0}	Q_{B0}	Q_{H0}
H	L	⎍	H	X	H	Q_{An}	Q_{Gn}
H	L	⎍	L	X	L	Q_{An}	Q_{Gn}
H	H	X	X	X	Q_{A0}	Q_{B0}	Q_{H0}

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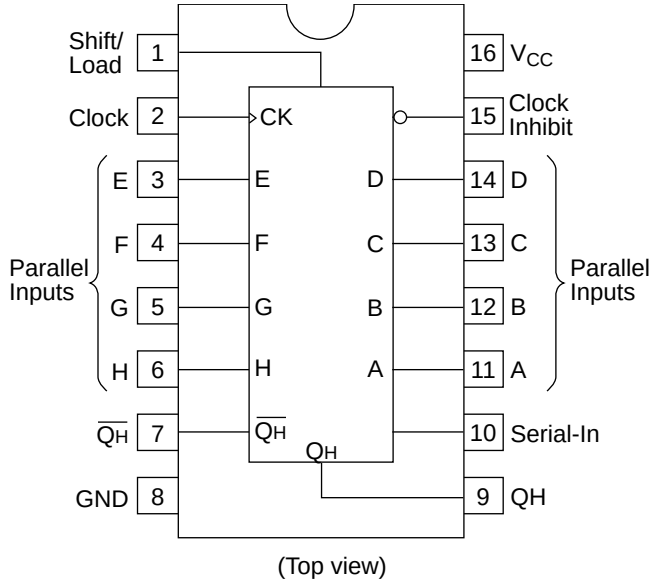
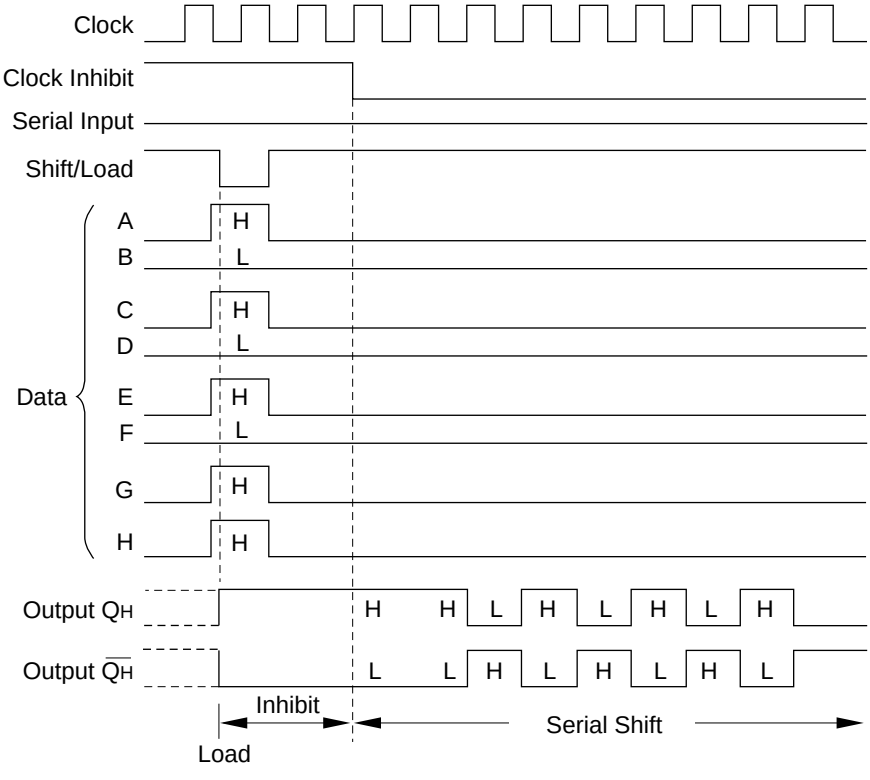
Pin Arrangement



Timing Diagram



DC Characteristics

Item	Symbol	V_{CC} (V)	Ta = 25°C Min	Typ	Max	Ta = –40 to +85°C Min	Max	Unit	Test Conditions
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	Iin	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, Iout = 0 µA

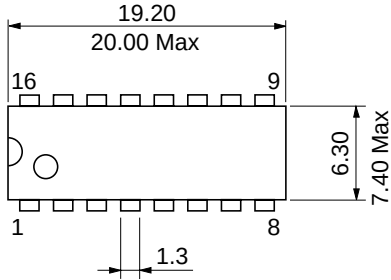
AC Characteristics (C_L = 50 pF, Input $t_r = t_f$ = 6 ns)

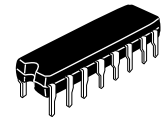
			Ta = 25°C			Ta = –40 to +85°C			
Item	**Symbol**	**V_{cc} (V)**	**Min**	**Typ**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**
Maximum clock frequency	f_{max}	2.0	—	—	5	—	4	MHz	
		4.5	—	—	27	—	21		
		6.0	—	—	32	—	25		
Propagation delay time	t_{PLH} t_{PHL}	2.0	—	—	150	—	190	ns	Clock to Q_H or $\overline{Q_H}$
		4.5	—	21	30	—	38		
		6.0	—	—	26	—	33		
		2.0	—	—	160	—	200		Shift/Load to Q_H or $\overline{Q_H}$
		4.5	—	23	32	—	40		
		6.0	—	—	27	—	34		
		2.0	—	—	150	—	190		H to Q_H or $\overline{Q_H}$
		4.5	—	21	30	—	38		
		6.0	—	—	26	—	33		
Setup time	t_{su}	2.0	100	—	—	125	—	ns	Parallel data inputs to
		4.5	20	–3	—	25	—		Shift/Load
		6.0	17	—	—	21	—		
		2.0	100	—	—	125	—		Sherial input to Clock
		4.5	20	3	—	25	—		
		6.0	17	—	—	21	—		
		2.0	100	—	—	125	—		Shift/load to Clock
		4.5	20	—	—	25	—		
		6.0	17	—	—	21	—		
Removal time	t_{rem}	2.0	100	—	—	125	—	ns	Clock to Clock inhibit or
		4.5	20	6	—	25	—		Clock inhibit to Clock
		6.0	17	—	—	21	—		
Hold time	t_h	2.0	5	—	—	5	—	ns	Shift/Load to parallel data input
		4.5	5	–3	—	5	—		
		6.0	5	—	—	5	—		
		2.0	5	—	—	5	—		Clock to Serial data input
		4.5	5	3	—	5	—		
		6.0	5	—	—	5	—		
		2.0	5	—	—	5	—		Clock to Shift/Load
		4.5	5	—	—	5	—		
		6.0	5	—	—	5	—		

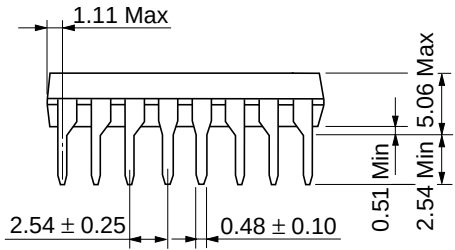
AC Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns) (cont)

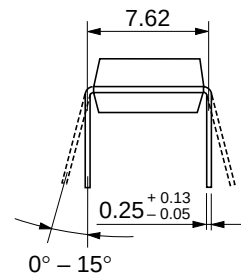
			Ta = 25°C			Ta = –40 to +85°C			
Item	**Symbol**	**V_{CC} (V)**	**Min**	**Typ**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**
Pulse width	t_w	2.0	80	—	—	100	—	ns	Clock, Shift/Load
		4.5	16	6	—	20	—		
		6.0	14	—	—	17	—		
Output rise/fall time	t_{TLH}	2.0	—	—	75	—	95	ns	
	t_{THL}	4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	Cin	—	—	5	10	—	10	pF	

Unit: mm



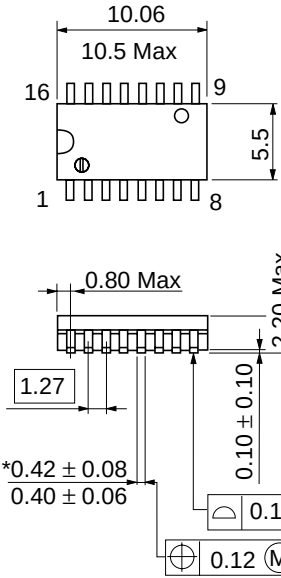


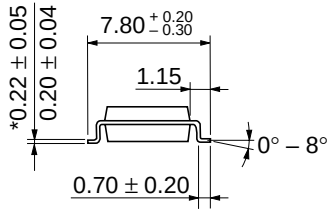


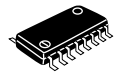


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g

Unit: mm



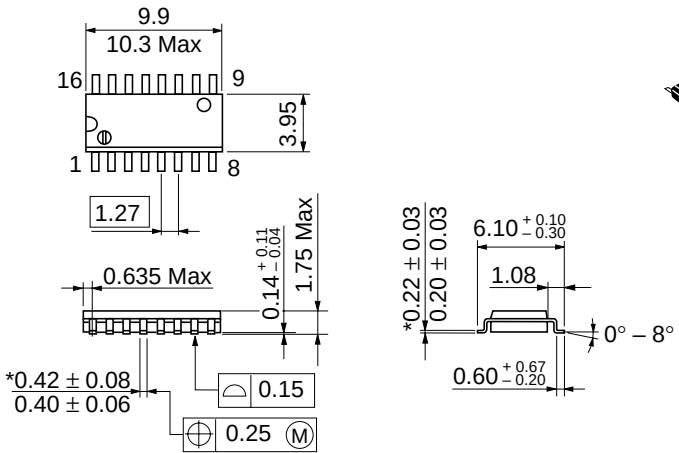




*Dimension including the plating thickness
Base material dimension

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

Unit: mm



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

*Dimension including the plating thickness
Base material dimension

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