
HD74AC165/HD74ACT165

Parallel-Load 8-bit Shift Register

HITACHI

ADE-205-374 (Z)
1st. Edition
Sep. 2000

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.

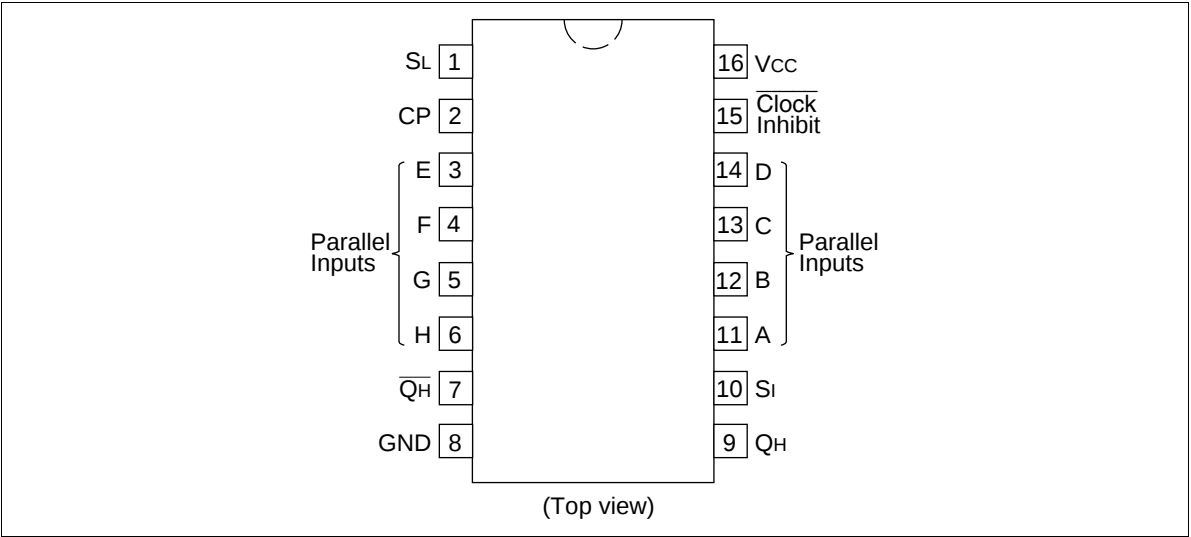
Clocking is accomplished through a 2-input NOR gate permitting one input to be used as a clock inhibit function. Holding either of the clock inputs high inhibits clocking, and holding either clock input low with the Shift/Load input high enables the other clock input. Data transfer occurs on the positive 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

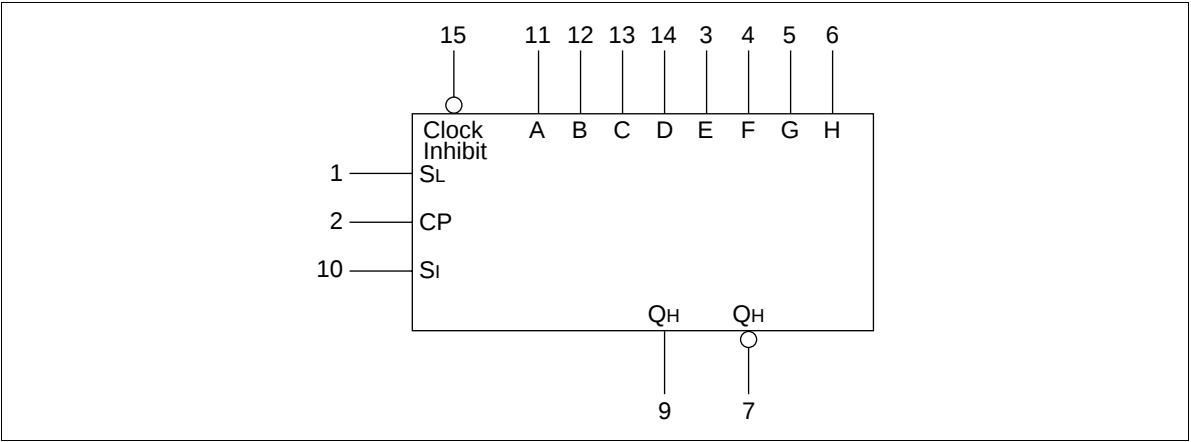
- Outputs Source/Sink 24 mA
- HD74ACT165 has TTL-Compatible Inputs

HD74AC165/HD74ACT165

Pin Arrangement



Logic Symbol



Pin Names

A to H	Parallel Inputs
S_I	Serial Input
CP	Clock Input
S_L	Shift Load
$\overline{\text{Clock Inhibit}}$	Clock Inhibit
$Q_H, \overline{Q_H}$	Outputs

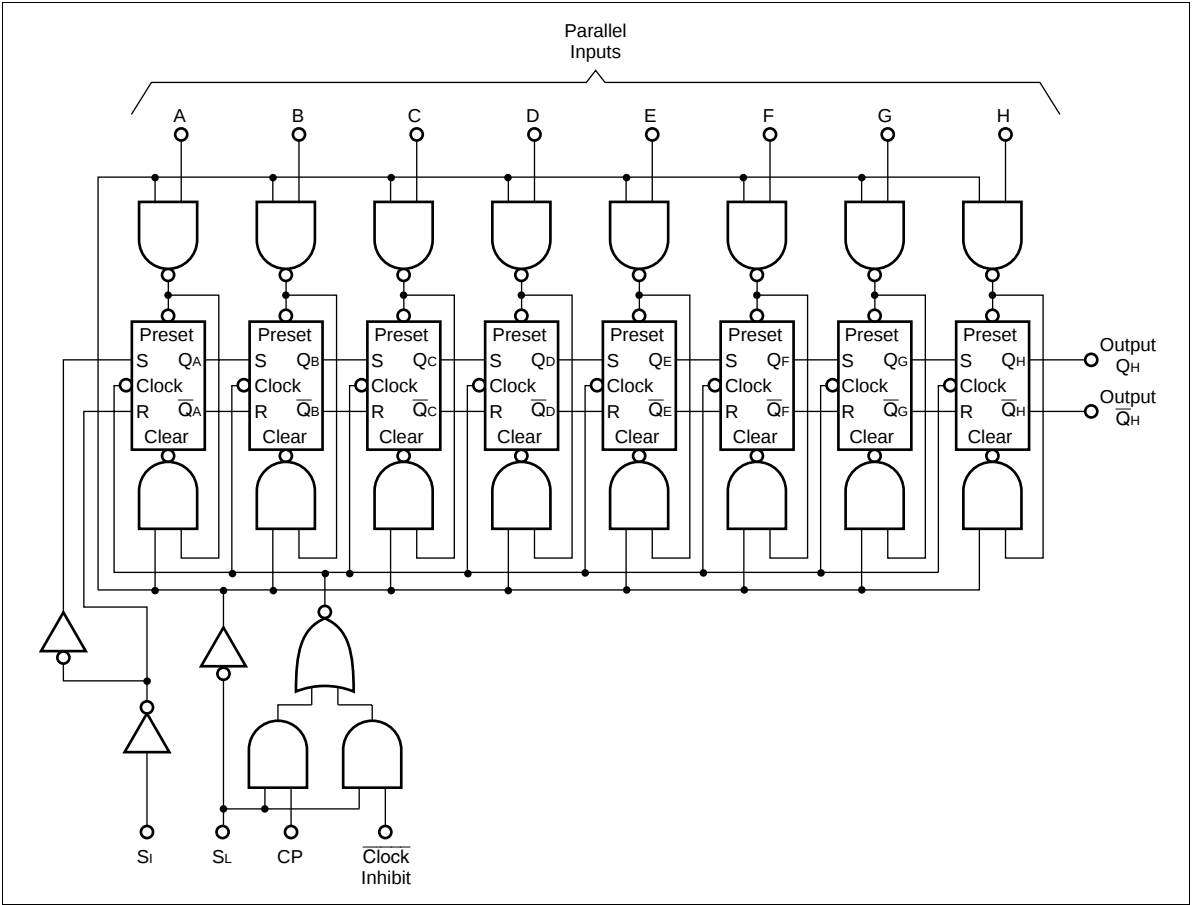
Truth Table

Inputs							
S _L	Clock		S _i	Parallel	Internal Outputs		Outputs
	Inhibit	CP		A H	Q _A	Q _B	Q _H
L	X	X	X	a h	a	b	h
H	L	L	X	X	Q _{A$\overline{D}$}	Q _{B$\overline{O}$}	Q _{HO}
H	L		H	X	H	Q _{An}	Q _{Gn}
H	L		L	X	L	Q _{An}	Q _{Cn}
H	H	X	X	X	Q _{A$\overline{D}$}	Q _{B$\overline{O}$}	Q _{HO}

- H : High Voltage Level
L : Low Voltage Level
X : Immaterial
 : Low-to-High Clock Transition

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Logic Diagram



DC Characteristics (unless otherwise specified)

Item	Symbol	Max	Unit	Condition
Maximum quiescent supply current	I_{CC}	80	μA	$V_{IN} = V_{CC}$ or ground, $V_{CC} = 5.5 V$, $T_a = \text{Worst case}$
Maximum quiescent supply current	I_{CC}	8.0	μA	$V_{IN} = V_{CC}$ or ground, $V_{CC} = 5.5 V$, $T_a = 25^{\circ}C$
Maximum additional I_{CC}/input (HD74ACT165)	I_{CCT}	1.5	mA	$V_{IN} = V_{CC} - 2.1 V$, $V_{CC} = 5.5 V$, $T_a = \text{Worst case}$

AC Characteristics: HD74AC165

Item	Symbol	V _{CC} (V)* ¹	Ta = +25°C C _L = 50 pF			Ta = −40°C to +85°C C _L = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Maximum count frequency	f _{max}	3.3	85	—	—	70	—	MHz
		5.0	100	—	—	90	—	
Propagation delay CP to Q _H or $\overline{Q}_H$	t _{PLH}	3.3	1.0	11.0	17.5	1.0	20.5	ns
		5.0	1.0	8.0	11.5	1.0	13.5	
Propagation delay CP to Q _H or $\overline{Q}_H$	t _{PHL}	3.3	1.0	12.0	18.0	1.0	21.5	ns
		5.0	1.0	8.5	12.5	1.0	14.5	
Propagation delay H to Q _H or $\overline{Q}_H$	t _{PLH}	3.3	1.0	13.5	19.5	1.0	22.5	ns
		5.0	1.0	9.5	13.5	1.0	15.5	
Propagation delay H to Q _H or $\overline{Q}_H$	t _{PHL}	3.3	1.0	9.0	14.0	1.0	16.5	ns
		5.0	1.0	6.5	9.5	1.0	11.0	
Propagation delay S _L to Q _H or $\overline{Q}_H$	t _{PLH}	3.3	1.0	11.5	20.5	1.0	23.5	ns
		5.0	1.0	8.5	14.0	1.0	16.0	
Propagation delay S _L to Q _H or $\overline{Q}_H$	t _{PHL}	3.3	1.0	10.0	16.5	1.0	19.5	ns
		5.0	1.0	7.5	11.0	1.0	12.5	

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

AC Operating Requirements: HD74AC165

			Ta = +25°C CL = 50 pF	Ta = −40°C to +85°C CL = 50 pF		
Item	Symbol	VCC (V)*1	Typ	Guaranteed Minimum		Unit
Setup time, HIGH or LOW H to SL	tsu	3.3	3.5	5.0	6.0	ns
		5.0	2.5	4.0	4.5	
Hold time, HIGH or LOW H to SL	th	3.3	−1.0	0.5	0.5	ns
		5.0	−0.5	0.5	0.5	
Setup time, HIGH or LOW Sin to CP	tsu	3.3	1.0	3.5	4.0	ns
		5.0	0.5	3.0	3.5	
Hold time, HIGH or LOW Sin to CP	th	3.3	1.5	2.0	2.0	ns
		5.0	1.0	2.0	2.0	
Setup time, HIGH or LOW SL to CP	tsu	3.3	3.0	5.0	6.0	ns
		5.0	2.0	4.0	4.5	
Hold time, HIGH or LOW SL to CP	th	3.3	−2.0	0.0	0.0	ns
		5.0	−1.0	0.0	0.0	
Recovery time clock inhibit to CP	trec	3.3	2.5	3.5	3.5	ns
		5.0	2.0	3.0	3.0	
Clock pulse width	tw	3.3	3.0	5.5	7.0	ns
		5.0	3.0	4.5	5.0	

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

AC Characteristics: HD74ACT165

Item	Symbol	V _{CC} (V)* ¹	Ta = +25°C C _L = 50 pF			Ta = -40°C to +85°C C _L = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Maximum count frequency	f _{max}	5.0	70	—	—	60	—	MHz
Propagation delay CP to Q _H or $\overline{Q}_H$	t _{PLH}	5.0	1.0	8.5	13.5	1.0	15.5	ns
Propagation delay CP to Q _H or $\overline{Q}_H$	t _{PHL}	5.0	1.0	9.5	14.0	1.0	16.5	ns
Propagation delay H to Q _H or $\overline{Q}_H$	t _{PLH}	5.0	1.0	10.5	13.5	1.0	15.5	ns
Propagation delay H to Q _H or $\overline{Q}_H$	t _{PHL}	5.0	1.0	7.5	11.0	1.0	12.5	ns
Propagation delay S _L to Q _H or $\overline{Q}_H$	t _{PLH}	5.0	1.0	9.5	15.0	1.0	18.0	ns
Propagation delay S _L to Q _H or $\overline{Q}_H$	t _{PHL}	5.0	1.0	8.5	13.0	1.0	15.5	ns

Note: 1. Voltage Range 5.0 is 5.0 V ± 0.5 V

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AC Operating Requirements: HD74ACT165

Item	Symbol	V _{CC} (V)*1	Ta = +25°C C _L = 50 pF	Ta = −40°C to +85°C C _L = 50 pF		Unit
			Typ	Guaranteed Minimum		
Setup time, HIGH or LOW H to S _L	t _{su}	5.0	3.0	4.0	4.5	ns
Hold time, HIGH or LOW H to S _L	t _h	5.0	−1.0	0.0	0.0	ns
Setup time, HIGH or LOW S _{in} to CP	t _{su}	5.0	0.5	3.0	3.5	ns
Hold time, HIGH or LOW S _{in} to CP	t _h	5.0	0.5	2.0	2.0	ns
Setup time, HIGH or LOW S _L to CP	t _{su}	5.0	2.0	4.0	4.5	ns
Hold time, HIGH or LOW S _L to CP	t _h	5.0	−1.5	0.0	0.0	ns
Recovery time clock inhibit to CP	t _{rec}	5.0	2.0	3.0	3.0	ns
Clock pulse width	t _w	5.0	3.5	7.0	8.0	ns

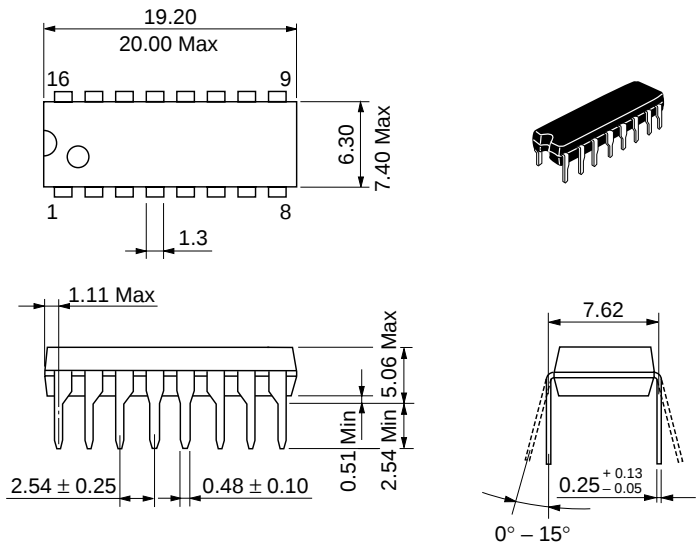
Note: 1. Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	C _{IN}	4.5	pF	V _{CC} = 5.5 V
Power dissipation capacitance	C _{PD}	50	pF	V _{CC} = 5.0 V

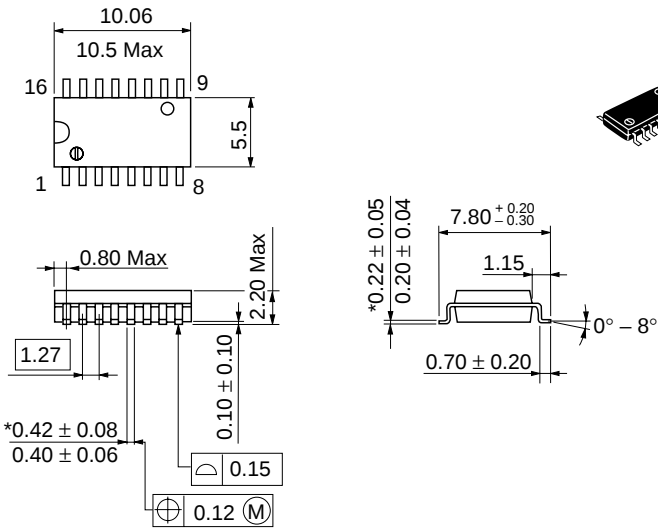
Package Dimensions

Unit: mm



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

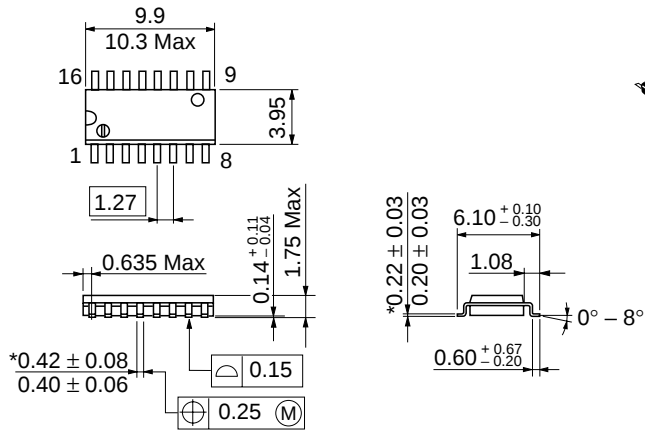
Unit: mm



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

*Dimension including the plating thickness
Base material dimension

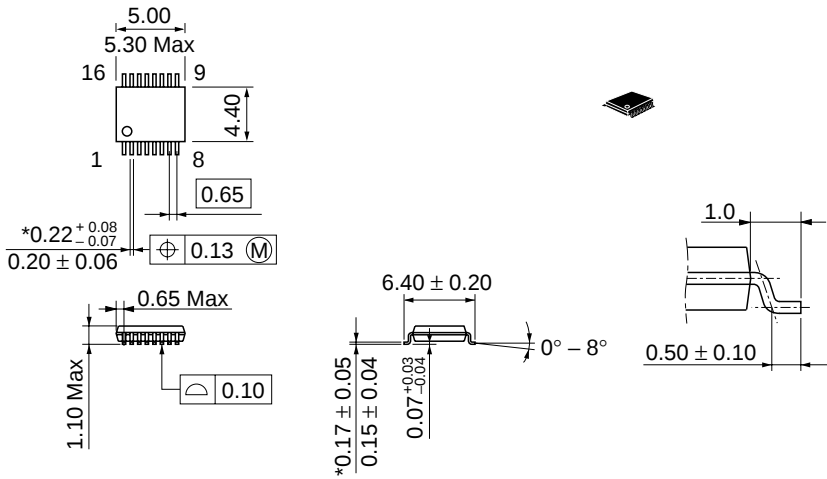
Unit: mm



*Dimension including the plating thickness
Base material dimension

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

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	TTP-16DA
JEDEC	—
EIAJ	—
Mass (reference value)	0.05 g

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