
HD74AC195

4-bit Parallel-Access Shift Register

HITACHI

ADE-205-380 (Z)

1st. Edition

Sep. 2000

Description

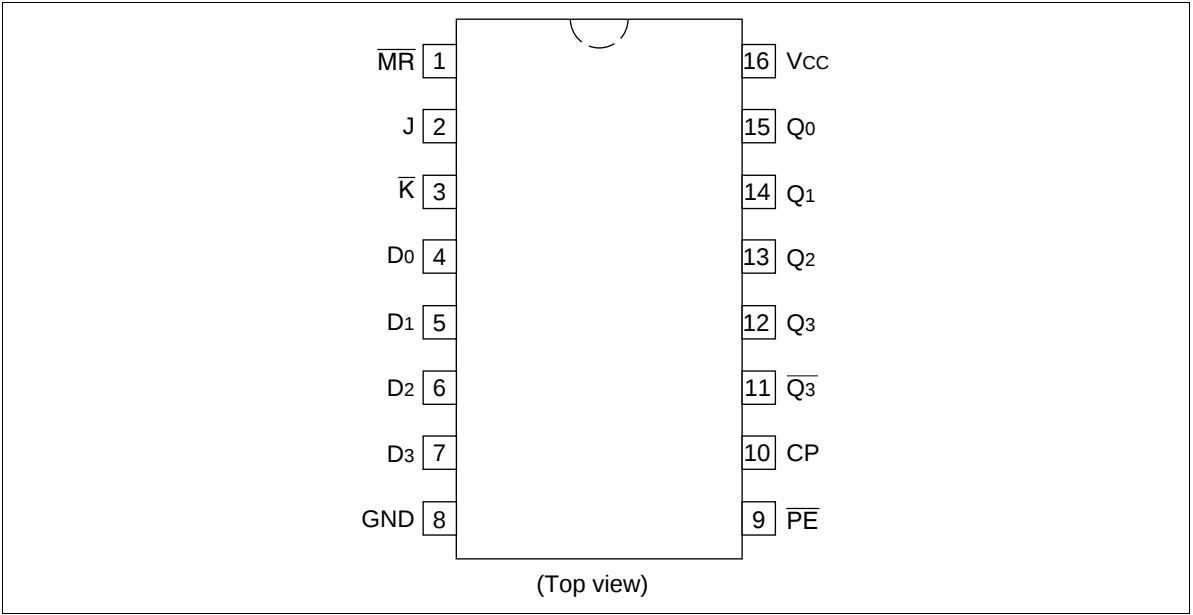
This shift register features parallel inputs, parallel outputs, J- $\overline{K}$ serial inputs, Shift/Load control input, and a direct overriding clear. This shift register can operate in two modes: Parallel load; Shift from Q_0 towards Q_3 .

Parallel loading is accomplished by applying the four bits of data, and taking the $\overline{PE}$ Input low. The data is loaded into the associated flip-flops and appears at the outputs after the positive transition of the CP input. During parallel loading, serial data flow is inhibited. Serial shifting occurs synchronously when the $\overline{PE}$ input is high. Serial data for this mode is entered at the J- $\overline{K}$ inputs. These inputs allow the first stage to perform as a J- $\overline{K}$ or toggle flip-flop as shown in the function table.

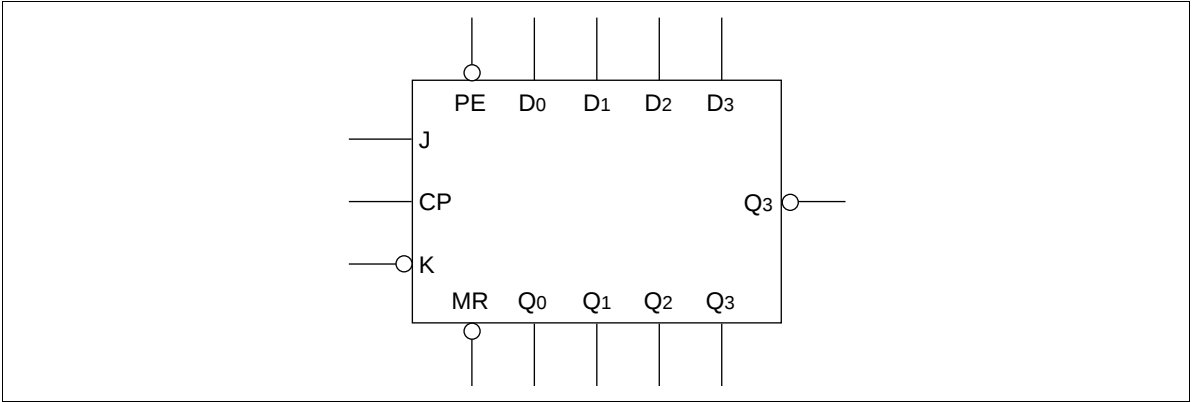
Features

- Shift Right and Parallel Load Capability
- J- $\overline{K}$ (D-Type) Inputs to First Stage
- Complement Output from Last Stage
- Asynchronous Master Reset
- Outputs Source/Sink 24 mA

Pin Arrangement



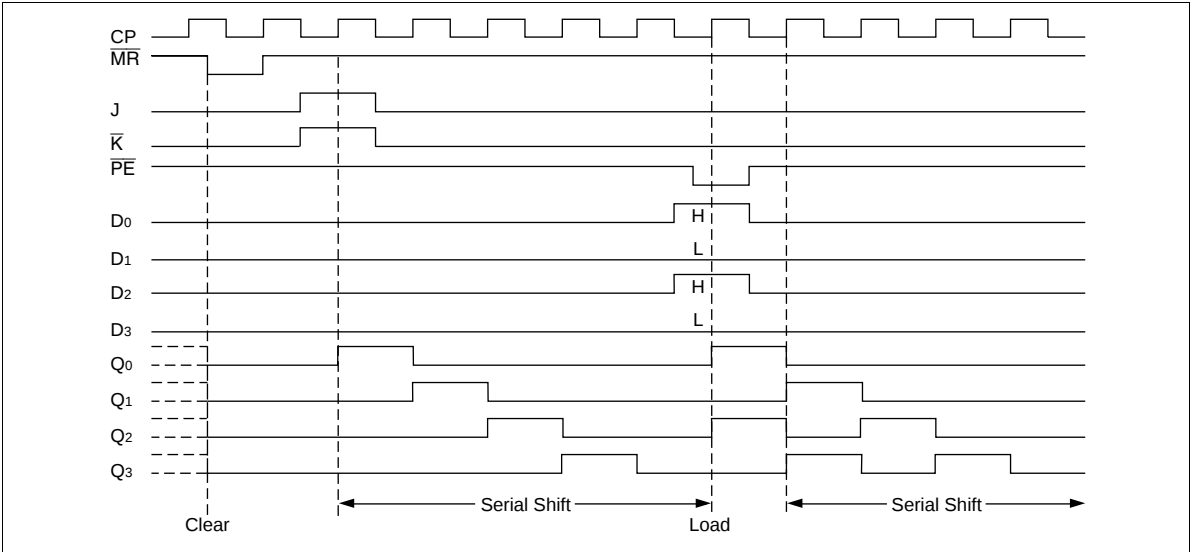
Logic Symbol



Pin Names

CP	Clock Pulse Input (Active Rising Edge)
D ₀ to D ₃	Parallel Data Inputs
$\overline{PE}$	Parallel Enable Input
$\overline{MR}$	Asynchronous Master Reset
J, $\overline{K}$	J- $\overline{K}$ or D Type Serial Inputs
Q ₀ to Q ₃ , $\overline{Q_3}$	Outputs

Timing Diagram



Mode Select-Function Table

Operating Modes	Inputs					Outputs					
	MR	CP	PE	J	K	D _n	Q ₀	Q ₁	Q ₂	Q ₃	$\overline{Q}_3$
Asynchronous Reset	L	X	X	X	X	X	L	L	L	L	H
Shift, Set First Stage	H		H	H	H	X	H	q ₀	q ₁	q ₂	$\overline{q}_2$
Shift, Reset First Stage	H		H	L	L	X	L	q ₀	q ₁	q ₂	$\overline{q}_2$
Shift, Toggle First Stage	H		H	H	L	X	$\overline{q}_0$	q ₀	q ₁	q ₂	$\overline{q}_2$
Shift, Retain First Stage	H		H	L	H	X	q ₀	q ₀	q ₁	q ₂	$\overline{q}_2$
Parallel Load	H		L	X	X	d _n	d ₀	d ₁	d ₂	d ₃	$\overline{d}_3$

H : HIGH Voltage Level

L : LOW Voltage Level

X : Immaterial

Lower case letters indicate the state of the referenced input (or output) one setup time prior to the LOW-to-HIGH transition.

: LOW-to-HIGH clock transition.

AC Characteristics: HD74AC195

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 clock frequency	f _{max}	3.3	75	—	—	65	—	MHz
		5.0	100	—	—	85	—	
Propagation delay CP to Q _n or $\overline{Q}_3$	t _{PLH}	3.3	1.0	9.0	13.0	1.0	15.0	ns
		5.0	1.0	5.5	10.0	1.0	11.5	
Propagation delay CP to Q _n or $\overline{Q}_2$	t _{PHL}	3.3	1.0	9.0	13.0	1.0	15.0	ns
		5.0	1.0	6.5	10.0	1.0	11.5	
Propagation delay $\overline{MR}$ to $\overline{Q}_2$	t _{PLH}	3.3	1.0	7.5	10.5	1.0	12.0	ns
		5.0	1.0	5.5	8.0	1.0	9.5	
Propagaion delay $\overline{MR}$ to $\overline{Q}_n$	t _{PHL}	3.3	1.0	6.0	9.0	1.0	10.5	ns
		5.0	1.0	5.0	7.0	1.0	8.0	

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 Operating Requirements: HD74AC195

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 J, $\overline{K}$ or $\overline{D}_n$ to CP	t _{su}	3.3	3.0	5.5	7.0		ns
		5.0	2.0	4.0	5.0		
Hold time, HIGH or LOW J, $\overline{K}$ or $\overline{D}_n$ to CP	t _h	3.3	−0.5	2.0	3.6		ns
		5.0	0.5	1.5	2.0		
Setup time, HIGH or LOW $\overline{PE}$ to CP	t _{su}	3.3	3.5	5.0	7.0		ns
		5.0	2.5	4.0	5.0		
Hold time, HIGH or LOW $\overline{PE}$ to CP	t _h	3.3	−2.0	0.0	0.0		ns
		5.0	−1.5	0.0	0.0		
Recovery time $\overline{MR}$ to CP	t _{rec}	3.3	−1.5	0.5	0.5		ns
		5.0	−1.0	0.5	0.5		
Pulse width	t _w	3.3	−3.0	5.5	7.0		ns
		5.0	−3.0	4.5	5.0		

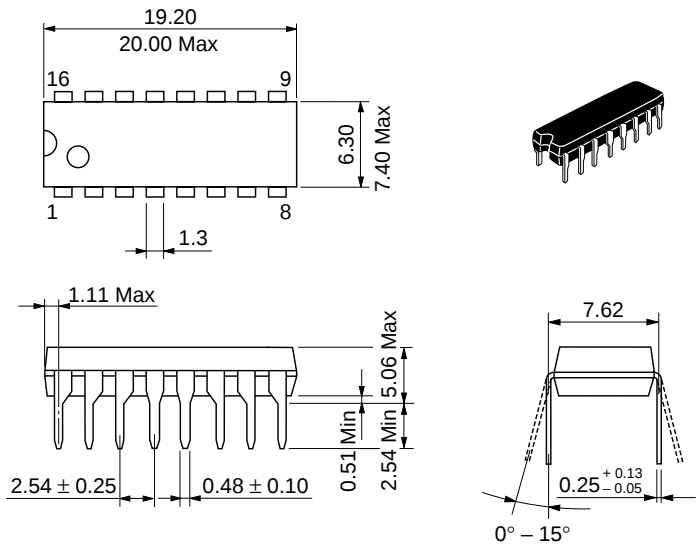
Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

Item	Symbol	Typ	Unit	Condition
Input capacitance	C _{IN}	4.5	pF	V _{CC} = 5.5 V
Power dissipation capacitance	C _{PD}	125	pF	V _{CC} = 5.0 V

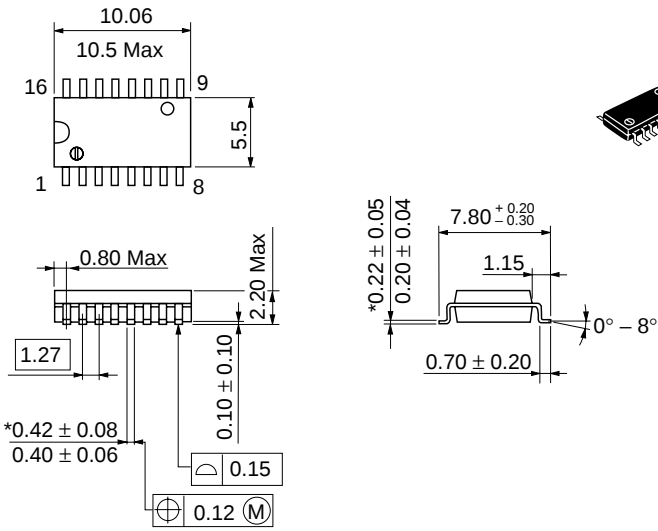
Package Dimensions

Unit: mm



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

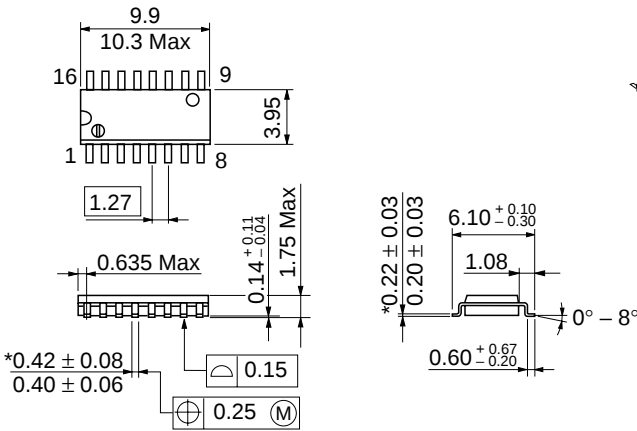
Unit: mm



*Dimension including the plating thickness
Base material dimension

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

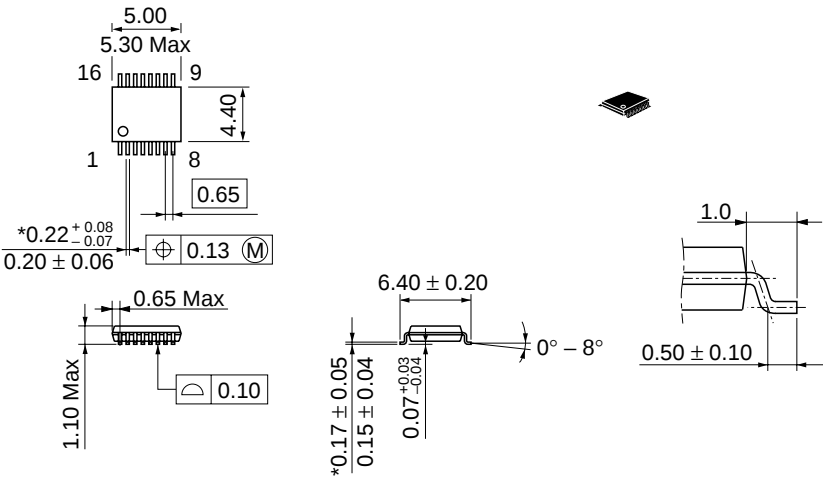
Unit: mm



*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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