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# HD74HC674

## 16-bit Shift Register

# HITACHI

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### Description

The HD74HC674 is a 16-bit parallel-in, serial-out shift register. A three-state input/output (data I/O) port provides access for entering serial data or reading the shift-register word in a recirculating loop.

The device has four basic modes of operation:

1. Hold (do nothing)
2. Write (serially via input/output)
3. Read (serially)
4. Load (parallel via data inputs)




Low-to-high-level changes at the chip select input should be made only when the clock input is low to prevent false clocking.

### Features

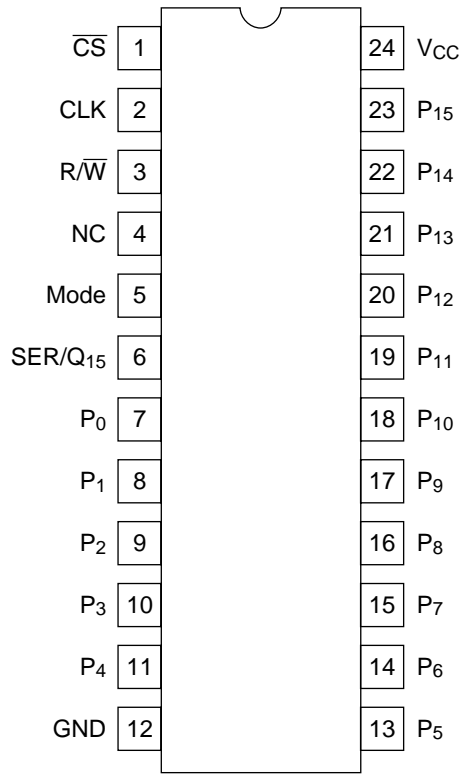
- High Speed Operation:  $t_{pd}$  (CLK to SER/Q<sub>15</sub>) = 17 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2$  to 6 V
- Low Input Current: 1  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 4  $\mu$ A max ( $T_a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

### Function Table

#### Inputs

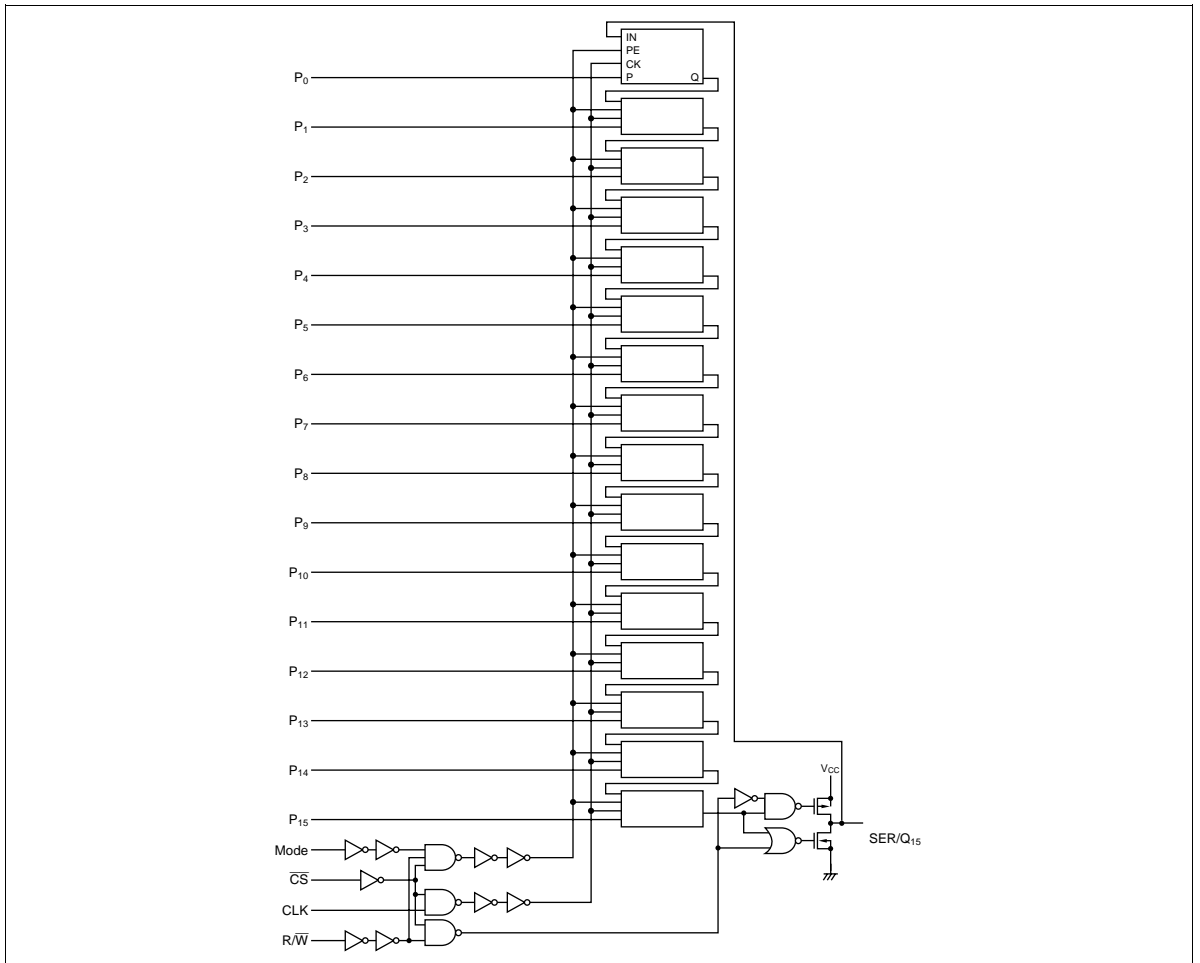
$\overline{\text{CS}}$	R/W	Mode	CLK	SER/Q <sub>15</sub>	Operation
H	X	X	X	Z	Do nothing
L	L	X		Z	Shift and write (serial load)
L	H	L		Q <sub>14n</sub>	Shift and read
L	H	H		P <sub>15</sub>	Parallel load

## Pin Arrangement



(Top view)

Logic Diagram



## DC Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C		Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min			Max
Input voltage	V <sub>IH</sub>	2.0	1.5	—	—	1.5	—	V	
		4.5	3.15	—	—	3.15	—		
		6.0	4.2	—	—	4.2	—		
	V <sub>IL</sub>	2.0	—	—	0.5	—	0.5		V
		4.5	—	—	1.35	—	1.35		
		6.0	—	—	1.8	—	1.8		
Output voltage	V <sub>OH</sub>	2.0	1.9	2.0	—	1.9	—	Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OH</sub> = -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 <sub>OH</sub> = -6 mA
		6.0	5.68	—	—	5.63	—		I <sub>OH</sub> = -7.8 mA
	V <sub>OL</sub>	2.0	—	0.0	0.1	—	0.1	Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OL</sub> = 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 <sub>OL</sub> = 6 mA
		6.0	—	—	0.26	—	0.33		I <sub>OL</sub> = 7.8 mA
Input current	I <sub>in</sub>	6.0	—	—	±0.1	—	±1.0	μA	Vin = V <sub>CC</sub> or GND
Quiescent supply current	I <sub>CC</sub>	6.0	—	—	4.0	—	40	μA	Vin = V <sub>CC</sub> or GND, I <sub>out</sub> = 0 μA
Off-state output current	I <sub>OZ</sub>	6.0	—	—	±0.5	—	±5.0	μA	Vin = V <sub>IH</sub> or V <sub>IL</sub> , Vout = V <sub>CC</sub> or GND

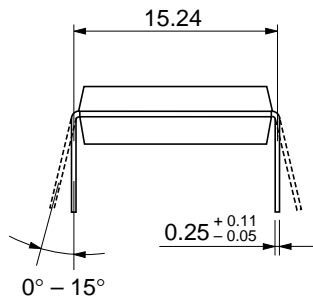
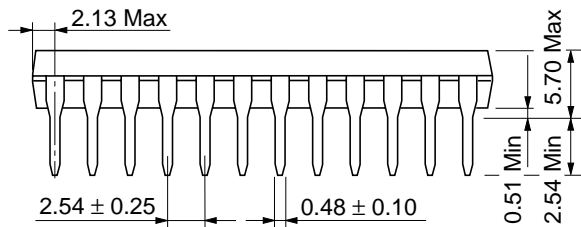
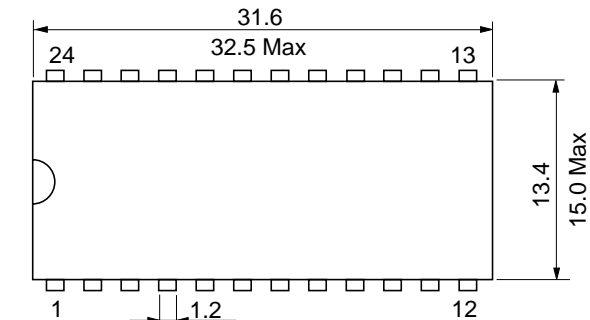
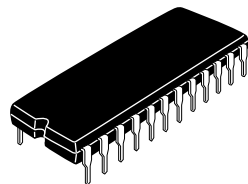
**AC Characteristics** ( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

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	—	—	32	—	25		
Propagation delay time	$t_{PLH}$	2.0	—	—	200	—	250	ns	Clock to SER/Q <sub>15</sub>
	$t_{PHL}$	4.5	—	17	40	—	50		
		6.0	—	—	34	—	43		
Output enable time	$t_{ZH}$	2.0	—	—	150	—	190	ns	
	$t_{ZL}$	4.5	—	12	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	$t_{HZ}$	2.0	—	—	150	—	190	ns	
	$t_{LZ}$	4.5	—	14	30	—	38		
		6.0	—	—	26	—	33		
Pulse width	$t_w$	2.0	80	—	—	100	—	ns	
		4.5	16	6	—	20	—		
		6.0	14	—	—	17	—		
Setup time	$t_{su}$	2.0	100	—	—	125	—	ns	SER/Q <sub>15</sub> to Clock
		4.5	20	—	—	25	—		
		6.0	17	—	—	21	—		
	$t_{su}$	2.0	100	—	—	125	—	ns	P to Clock
		4.5	20	—	—	25	—		
		6.0	17	—	—	21	—		
	$t_{su}$	2.0	100	—	—	125	—	ns	Mode to Clock
		4.5	20	—	—	25	—		
		6.0	17	—	—	21	—		
	$t_{su}$	2.0	100	—	—	125	—	ns	R/W or CS to Clock
		4.5	20	—	—	25	—		
		6.0	17	—	—	21	—		

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## AC Characteristics ( $C_L = 50$ pF, Input $t_r = t_f = 6$ 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	Clock to SER/Q <sub>15</sub>	
		4.5	5	—	—	5	—			
		6.0	5	—	—	5	—			
	$t_h$	$t_h$	2.0	5	—	—	5	—	ns	Clock to P
			4.5	5	—	—	5	—		
			6.0	5	—	—	5	—		
	$t_h$	$t_h$	2.0	5	—	—	5	—	ns	Clock to mode
			4.5	5	—	—	5	—		
			6.0	5	—	—	5	—		
Output rise/fall time	$t_{TLH}$	2.0	—	—	60	—	75	ns		
	$t_{THL}$	4.5	—	4	12	—	15			
		6.0	—	—	10	—	13			
Input capacitance	$C_{in}$	—	—	5	10	—	10	pF		



Hitachi Code	DP-24
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	3.1 g

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