

# HD74HC589

## 8-bit Serial of Parallel-input/Serial-output Shift Register (with 3-state outputs)

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### Description






The HD74HC589 is similar in function to the HD74HC597, which is not a 3-state device.

This device consists of an 8-bit storage latch which feeds parallel data to an 8-bit shift register. Data can also be loaded serially (see Function Table). The shift register output,  $O_H$ , is a three-state output, allowing this device to be used in bus-oriented systems.

### Features

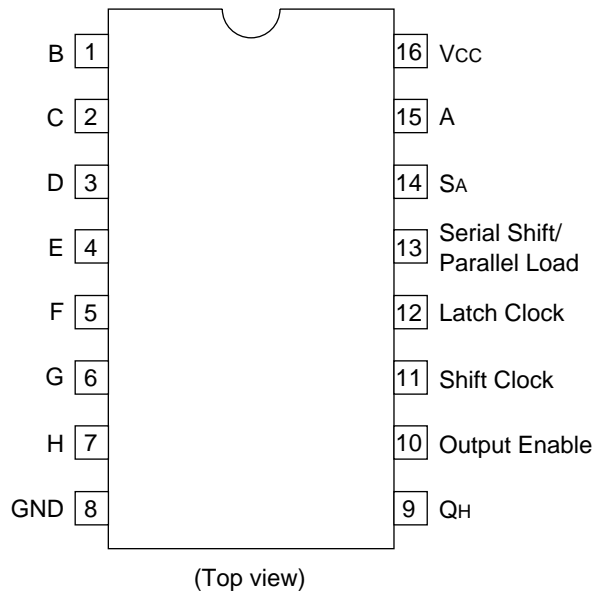
- High Speed Operation:  $t_{pd}$  (Shift Clock to  $Q_H$ ) = 15 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2$  to 6 V
- Low Input Current: 1  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 4  $\mu$ A max ( $T_a = 25^\circ\text{C}$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

### Function Table

Latch Clock LCK	Shift Clock SCK	Serial Shift/ Parallel Load	Output Enable OE	Function
	X	X	X	Data are loaded into input latches
	X	L	L	Data are loaded from input into shift registers
X	X	L	L	Data are transferred from input latches to shift registers
L, H, 	L, H, 	X	H	Outputs are disabled
X		H	L	Serial shift $Q_n = Q_{n-1}$ , $Q_0 = \text{SER}$

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## Pin Arrangement

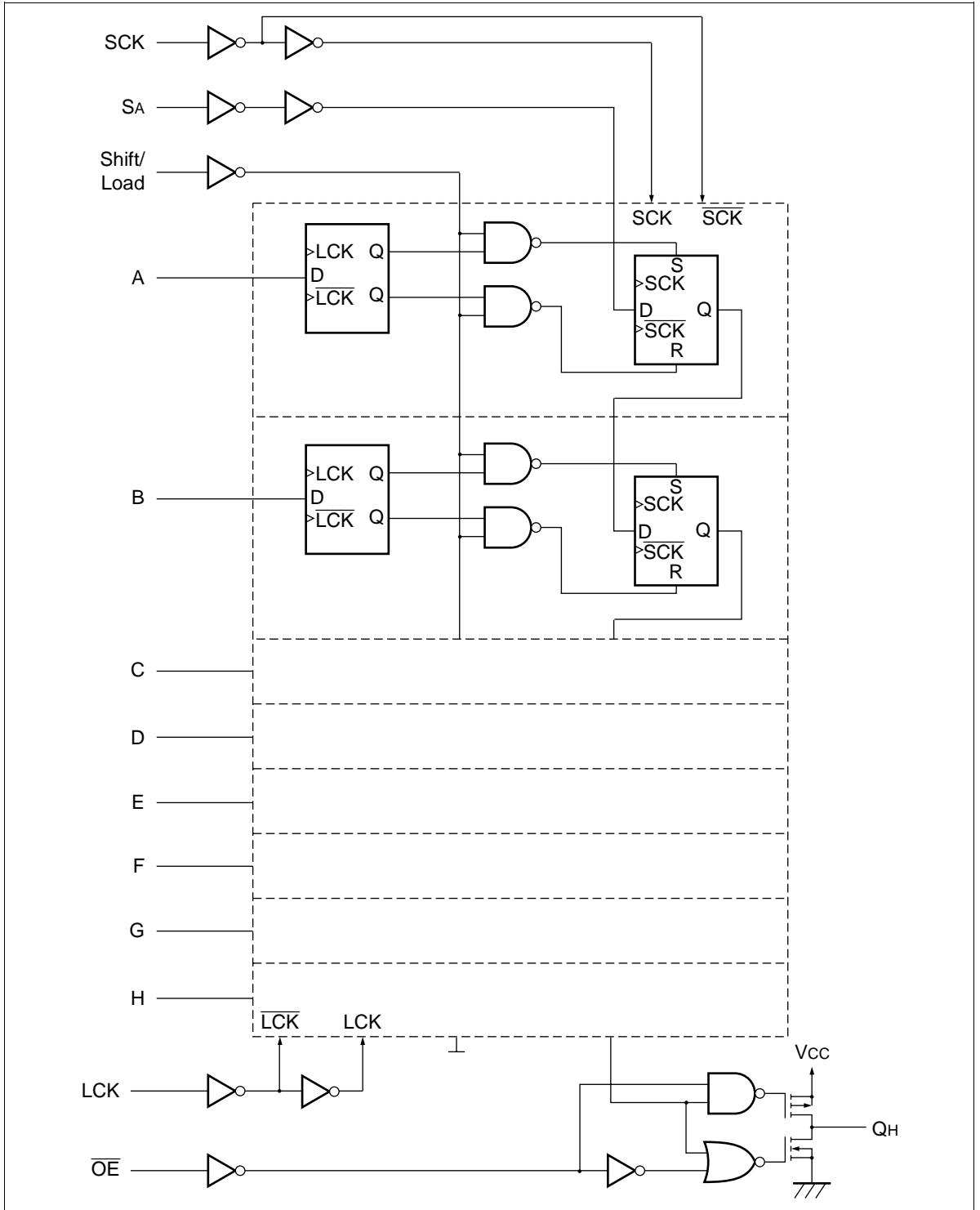


## Absolute Maximum Ratings

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	$I_{OUT}$	$\pm 35$	mA
DC current drain per $V_{CC}$ , GND	$I_{CC}$ , $I_{GND}$	$\pm 75$	mA
DC input diode current	$I_{IK}$	$\pm 20$	mA
DC output diode current	$I_{OK}$	$\pm 20$	mA
Power Dissipation per package	$P_T$	500	mW
Storage temperature	$T_{stg}$	-65 to +150	$^{\circ}C$

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Logic Diagram



# HD74HC589

## 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	—	V	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
		6.0	—	0.0	0.1	—	0.1			V
	V <sub>OL</sub>	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		
		6.0	—	—	±0.5	—	±5.0	μA	Vin = V <sub>IH</sub> or V <sub>IL</sub> , Vout = V <sub>CC</sub> or GND	
		6.0	—	—	±0.1	—	±1.0	μA		
Quiescent supply current	I <sub>CC</sub>	6.0	—	—	4.0	—	40	μA	Vin = V <sub>CC</sub> or GND, Iout = 0 μA	

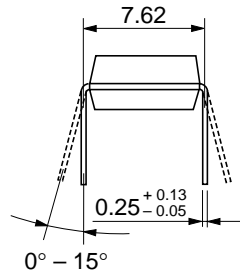
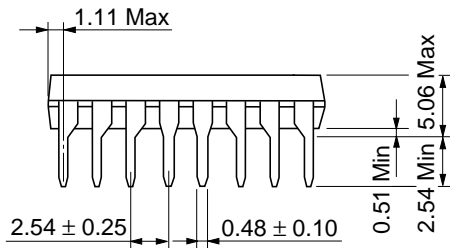
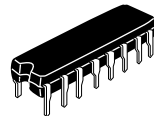
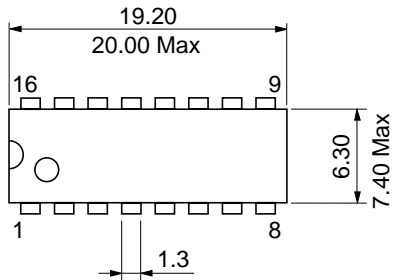
**AC Characteristics** ( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

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	Latch clock to $Q_H$
		4.5	—	20	40	—	50		
		6.0	—	—	34	—	43		
	$t_{PHL}$	2.0	—	—	175	—	220	ns	Shift clock to $Q_H$
		4.5	—	15	35	—	44		
		6.0	—	—	30	—	37		
$t_{PLH}$	2.0	—	—	175	—	220	ns	Serial shift/parallel load to $Q_H$	
	4.5	—	16	35	—	44			
	6.0	—	—	30	—	37			
Output enable time	$t_{ZL}$	2.0	—	—	150	—	190	ns	
		4.5	—	9	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	$t_{LZ}$	2.0	—	—	150	—	190	ns	
		4.5	—	14	30	—	38		
		6.0	—	—	26	—	33		
Pulse width	$t_w$	2.0	80	—	—	100	—	ns	
		4.5	16	8	—	20	—		
		6.0	14	—	—	17	—		
Setup time	$t_{su}$	2.0	100	—	—	125	—	ns	Data to latch clock
		4.5	20	1	—	25	—		
		6.0	17	—	—	21	—		
	$t_{su}$	2.0	100	—	—	125	—	ns	$S_A$ to shift clock
		4.5	20	—	—	25	—		
		6.0	17	—	—	21	—		
	$t_{su}$	2.0	100	—	—	125	—	ns	Serial shift/parallel load to shift clock
		4.5	20	—	—	25	—		
		6.0	17	—	—	21	—		

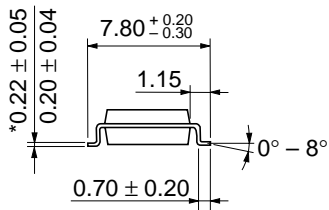
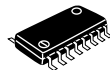
# HD74HC589

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

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	
Hold time	$t_h$	2.0	5	—	—	5	—	ns	Latch clock to data	
		4.5	5	0	—	5	—			
		6.0	5	—	—	5	—			
	$t_h$	$t_h$	2.0	5	—	—	5	—	ns	Shift clock to $S_A$
			4.5	5	—	—	5	—		
			6.0	5	—	—	5	—		
	$t_h$	$t_h$	2.0	5	—	—	5	—	ns	Shift clock to serial shift/ parallel load
			4.5	5	—	—	5	—		
			6.0	5	—	—	5	—		
Output rise/fall time	$t_{TLH}$	2.0	—	—	75	—	95	ns		
	$t_{THL}$	4.5	—	5	15	—	19			
	$t_{THL}$	6.0	—	—	13	—	16			
Input capacitance	$C_{in}$	—	—	5	10	—	10	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





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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