HD74HC589

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

HITACHI

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 µA max
- Low Quiescent Supply Current: I_{CC} (static) = 4 µA max (Ta = 25°C)

Function Table

Latch Clock LCK	Shift Clock SCK	Serial Shift/ Parallel Load	Output Enable $\overline{OE}$	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 transfered 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 = SER

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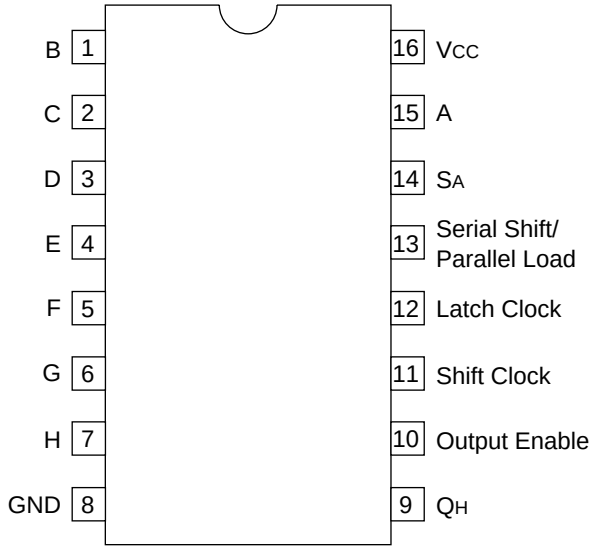
Pin Arrangement

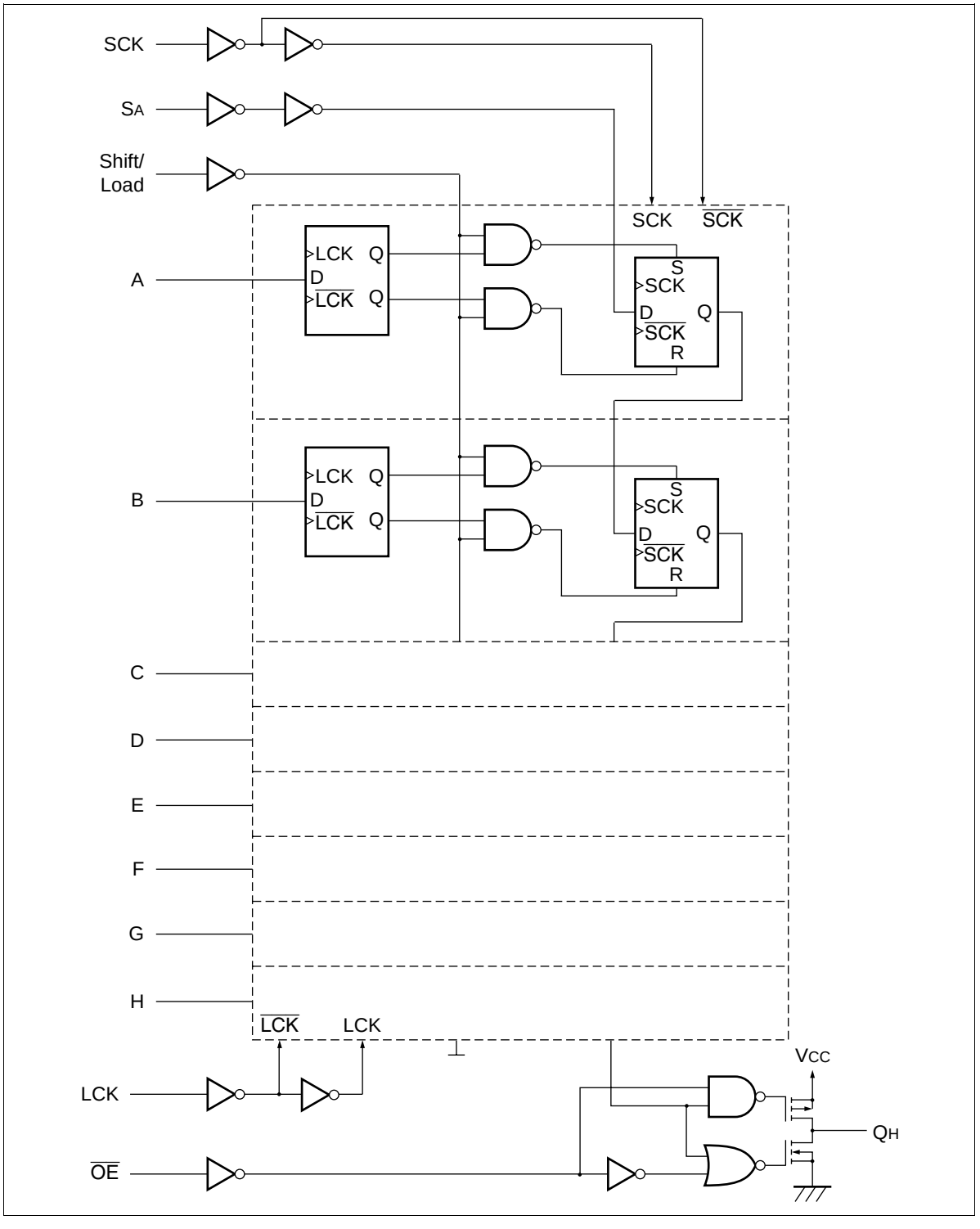


(Top view)

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}	±35	mA
DC current drain per V_{CC}, GND	I_{CC}, I_{GND}	±75	mA
DC input diode current	I_{IK}	±20	mA
DC output diode current	I_{OK}	±20	mA
Power Dissipation per package	P_T	500	mW
Storage temperature	Tstg	–65 to +150	°C

Logic 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} = –6 mA
		6.0	5.68	—	—	5.63	—		I_{OH} = –7.8 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} = 6 mA
		6.0	—	—	0.26	—	0.33		I_{OL} = 7.8 mA
Off-state output current	I_{OZ}	6.0	—	—	±0.5	—	±5.0	µA	Vin = V_{IH} or V_{IL}, Vout = V_{CC} or GND
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

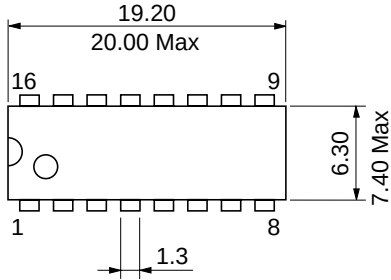
AC Characteristics (C_L = 50 pF, Input $t_r = t_f$ = 6 ns)

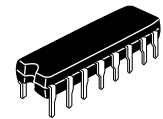
			Ta = 25°C			Ta = –40 to +85°C			
Item	**Symbol**	**V_{cc} (V)**	**Min**	**Typ**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**
Maximum clock frequency	f_{max}	2.0	—	—	5	—	4	MHz	
		4.5	—	—	27	—	21		
		6.0	—	—	32	—	25		
Propagation delay time	t_{PLH} t_{PHL}	2.0	—	—	200	—	250	ns	Latch clock to Q_H
		4.5	—	20	40	—	50		
		6.0	—	—	34	—	43		
	t_{PLH} t_{PHL}	2.0	—	—	175	—	220	ns	Shift clock to Q_H
		4.5	—	15	35	—	44		
		6.0	—	—	30	—	37		
	t_{PLH} t_{PHL}	2.0	—	—	175	—	220	ns	Serial shift/prallel load to Q_H
		4.5	—	16	35	—	44		
		6.0	—	—	30	—	37		
Output enable time	t_{ZL} t_{ZH}	2.0	—	—	150	—	190	ns	
		4.5	—	9	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	t_{LZ} t_{HZ}	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	—		

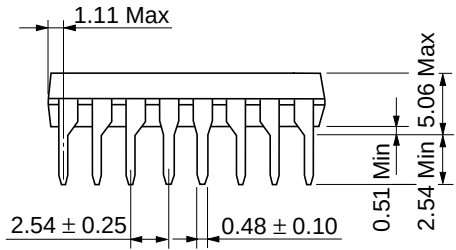
AC Characteristics (C_L = 50 pF, Input $t_r = t_f$ = 6 ns) (cont)

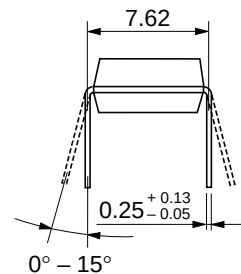
			Ta = 25°C			Ta = –40 to +85°C			
Item	**Symbol**	**V_{CC} (V)**	**Min**	**Typ**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**
Hold time	t_h	2.0	5	—	—	5	—	ns	Latch clock to data
		4.5	5	0	—	5	—		
		6.0	5	—	—	5	—		
	t_h	2.0	5	—	—	5	—	ns	Shift clock to S_A
		4.5	5	—	—	5	—		
		6.0	5	—	—	5	—		
	t_h	2.0	5	—	—	5	—	ns	Shift clock to serial shift/
		4.5	5	—	—	5	—		parallel load
		6.0	5	—	—	5	—		
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



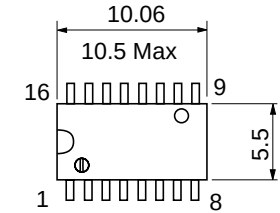


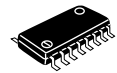


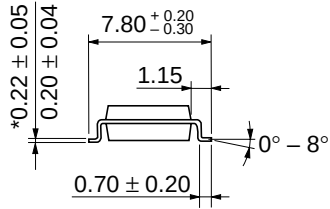


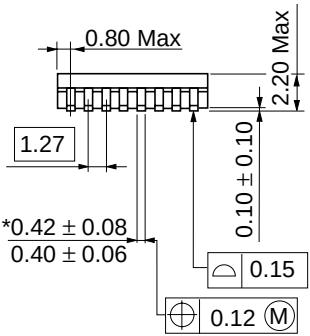
Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g

Unit: mm





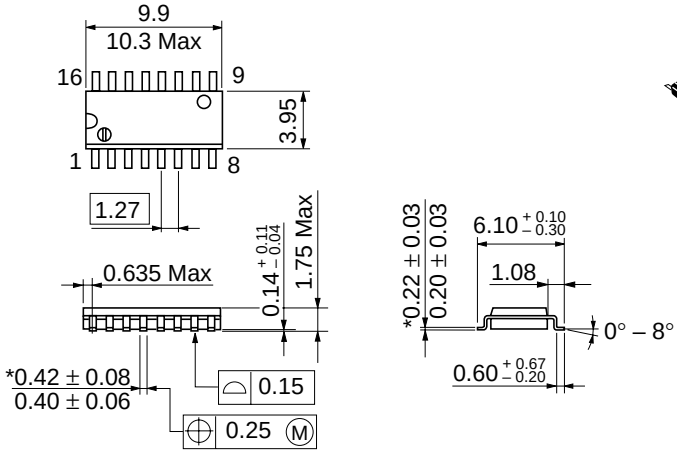


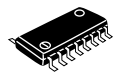


*Dimension including the plating thickness
Base material dimension

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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