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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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Not recommended
for new design

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HD74AC165

Parallel-Load 8-bit Shift Register

REJ03D0254-0200Z
 (Previous ADE-205-374 (Z))
 Rev.2.00
 Jul.16.2004

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

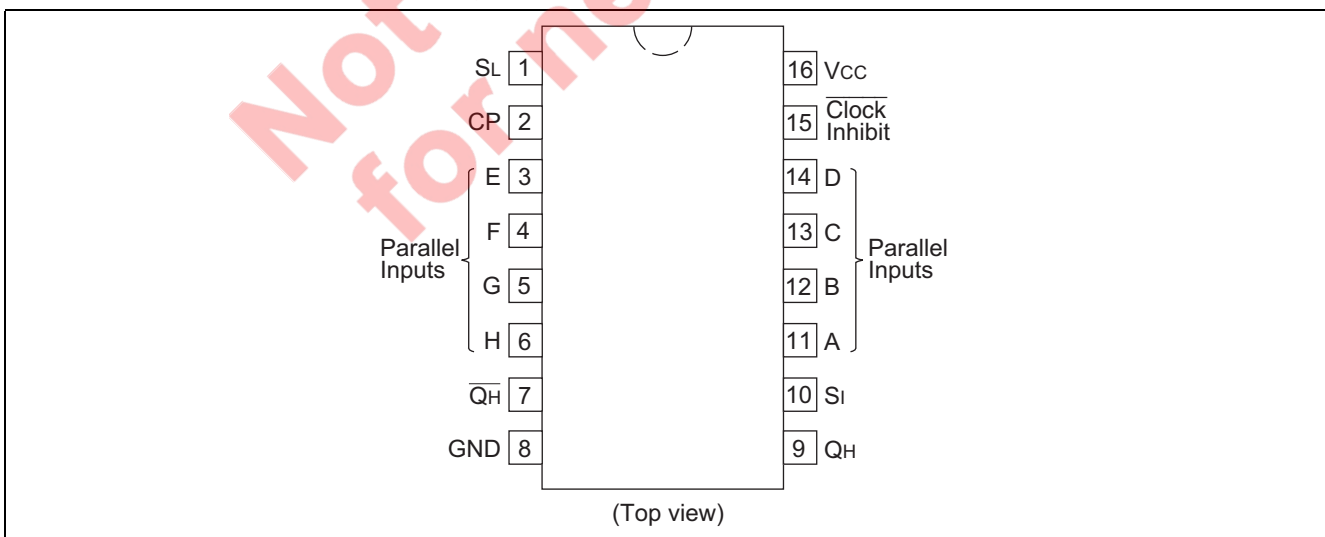
- Outputs Source/Sink 24 mA
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74AC165FPEL	SOP-16 pin (JEITA)	FP-16DAV	FP	EL (2,000 pcs/reel)
HD74AC165RPEL	SOP-16 pin (JEDEC)	FP-16DNV	RP	EL (2,500 pcs/reel)

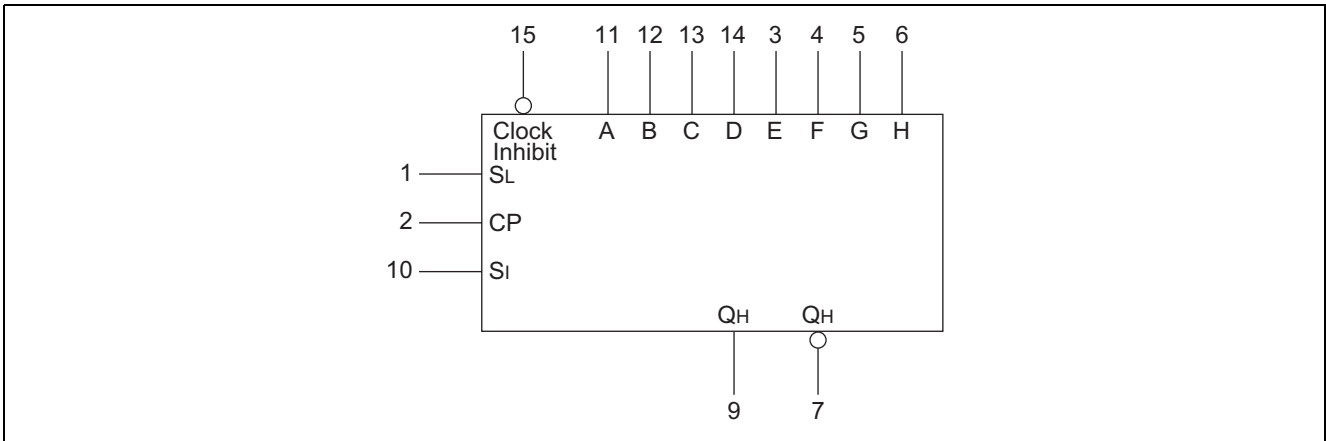
Notes: 1. Please consult the sales office for the above package availability.

2. The packages with lead-free pins are distinguished from the conventional products by adding V at the end of the package code.

Pin Arrangement



Logic Symbol



Pin Names

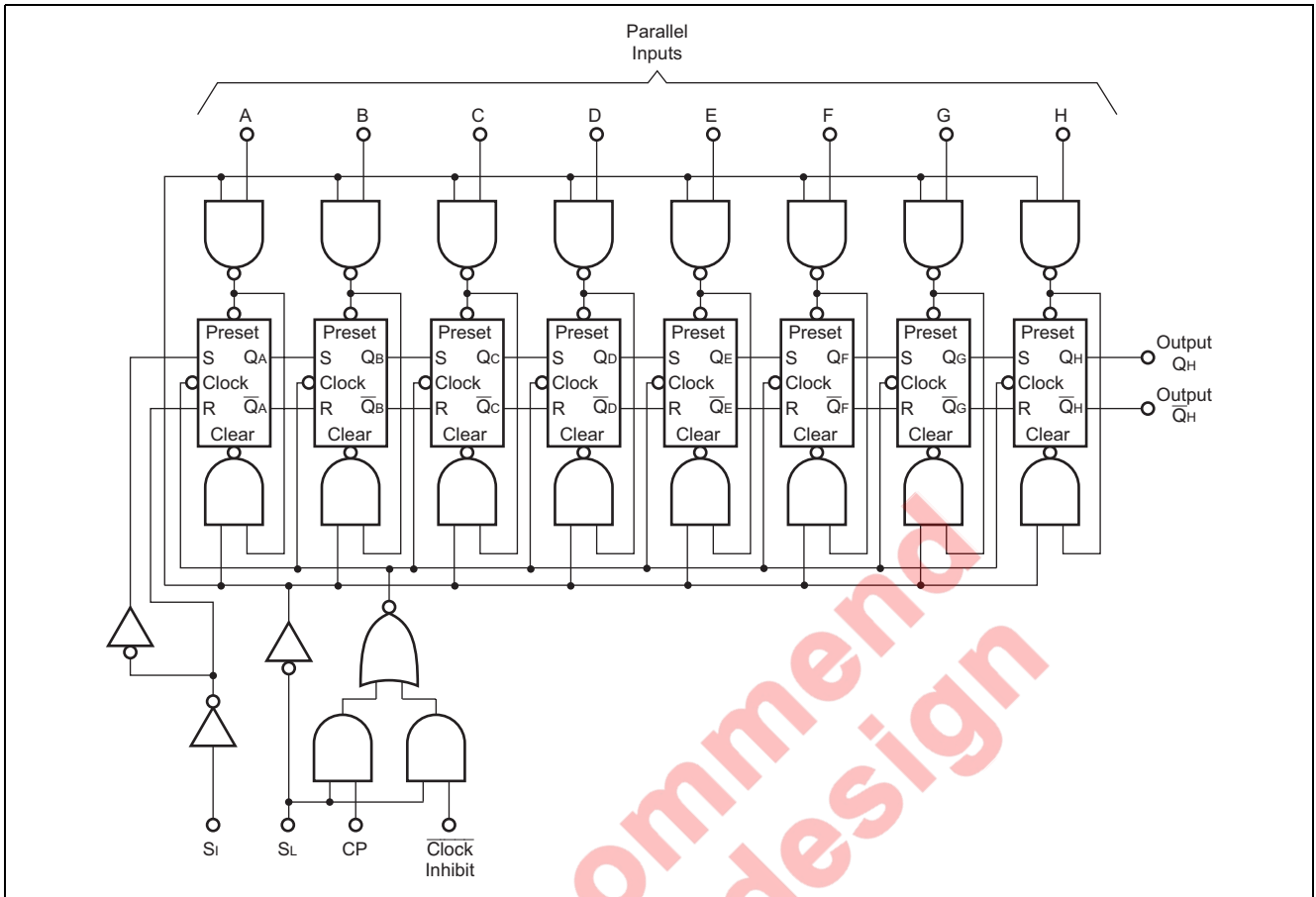
- A to H Parallel Inputs
- S_I Serial Input
- CP Clock Input
- S_L Shift Load
- $\overline{\text{Clock Inhibit}}$ Clock Inhibit
- Q_H, \overline{Q}_H Outputs

Truth Table

Inputs				Internal Outputs			Outputs
S _L	$\overline{\text{Clock Inhibit}}$	CP	S _I	Parallel 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

Logic Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Condition
Supply voltage	V_{CC}	-0.5 to 7	V	
DC input diode current	I_{IK}	-20	mA	$V_I = -0.5V$
		20	mA	$V_I = V_{CC}+0.5V$
DC input voltage	V_I	-0.5 to $V_{CC}+0.5$	V	
DC output diode current	I_{OK}	-50	mA	$V_O = -0.5V$
		50	mA	$V_O = V_{CC}+0.5V$
DC output voltage	V_O	-0.5 to $V_{CC}+0.5$	V	
DC output source or sink current	I_O	± 50	mA	
DC V_{CC} or ground current per output pin	I_{CC}, I_{GND}	± 50	mA	
Storage temperature	T_{stg}	-65 to +150	$^{\circ}C$	

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Condition
Supply voltage	V_{CC}	2 to 6	V	
Input and output voltage	V_I, V_O	0 to V_{CC}	V	
Operating temperature	T_a	-40 to +85	$^{\circ}C$	
Input rise and fall time (except Schmitt inputs) V_{IN} 30% to 70% V_{CC}	t_r, t_f	8	ns/V	$V_{CC} = 3.0V$
				$V_{CC} = 4.5V$
				$V_{CC} = 5.5V$

DC Characteristics

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Condition		
			min.	typ.	max.	min.	max.				
Input Voltage	V _{IH}	3.0	2.1	1.5	—	2.1	—	V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V		
		4.5	3.15	2.25	—	3.15	—				
		5.5	3.85	2.75	—	3.85	—				
	V _{IL}	3.0	—	1.50	0.9	—	0.9		V _{OUT} = 0.1 V or V _{CC} - 0.1 V		
		4.5	—	2.25	1.35	—	1.35				
		5.5	—	2.75	1.65	—	1.65				
Output voltage	V _{OH}	3.0	2.9	2.99	—	2.9	—	V	V _{IN} = V _{IL} or V _{IH} I _{OUT} = -50 μA		
		4.5	4.4	4.49	—	4.4	—				
		5.5	5.4	5.49	—	5.4	—				
		3.0	2.58	—	—	2.48	—			V _{IN} = V _{IL} or V _{IH} I _{OH} = -12 mA	
		4.5	3.94	—	—	3.80	—				I _{OH} = -24 mA
		5.5	4.94	—	—	4.80	—				I _{OH} = -24 mA
	V _{OL}	3.0	—	0.002	0.1	—	0.1	V _{IN} = V _{IL} or V _{IH} I _{OUT} = 50 μA			
		4.5	—	0.001	0.1	—	0.1				
		5.5	—	0.001	0.1	—	0.1				
		3.0	—	—	0.32	—	0.37		V _{IN} = V _{IL} or V _{IH} I _{OL} = 12 mA		
		4.5	—	—	0.32	—	0.37			I _{OL} = 24 mA	
		5.5	—	—	0.32	—	0.37			I _{OL} = 24 mA	
Input leakage current	I _{IN}	5.5	—	—	±0.1	—	±1.0	μA	V _{IN} = V _{CC} or GND		
Dynamic output current*	I _{OLD}	5.5	—	—	—	86	—	mA	V _{OLD} = 1.1 V		
	I _{OHD}	5.5	—	—	—	-75	—	mA	V _{OHD} = 3.85 V		
Quiescent supply current	I _{CC}	5.5	—	—	8.0	—	80	μA	V _{IN} = V _{CC} or ground		

*Maximum test duration 2.0 ms, one output loaded at a time.

AC Characteristics

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 \bar{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 \bar{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 \bar{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 \bar{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 \bar{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 \bar{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

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}	3.3	3.5	5.0	6.0	ns
		5.0	2.5	4.0	4.5	
Hold time, HIGH or LOW H to S _L	t _H	3.3	-1.0	0.5	0.5	ns
		5.0	-0.5	0.5	0.5	
Setup time, HIGH or LOW S _{in} to CP	t _{SU}	3.3	1.0	3.5	4.0	ns
		5.0	0.5	3.0	3.5	
Hold time, HIGH or LOW S _{in} to CP	t _H	3.3	1.5	2.0	2.0	ns
		5.0	1.0	2.0	2.0	
Setup time, HIGH or LOW S _L to CP	t _{SU}	3.3	3.0	5.0	6.0	ns
		5.0	2.0	4.0	4.5	
Hold time, HIGH or LOW S _L to CP	t _H	3.3	-2.0	0.0	0.0	ns
		5.0	-1.0	0.0	0.0	
Recovery time clock inhibit to CP	t _{REC}	3.3	2.5	3.5	3.5	ns
		5.0	2.0	3.0	3.0	
Clock pulse width	t _w	3.3	3.0	5.5	7.0	ns
		5.0	3.0	4.5	5.0	

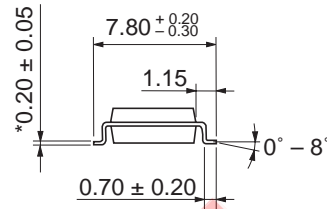
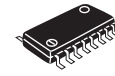
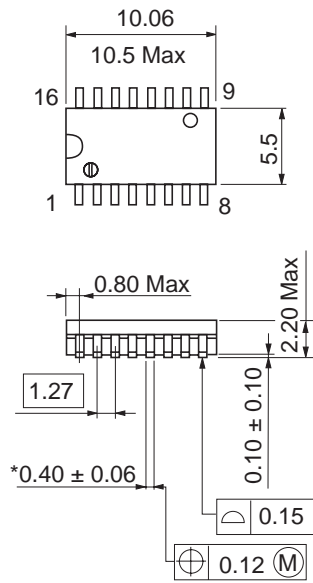
Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

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

Package Dimensions

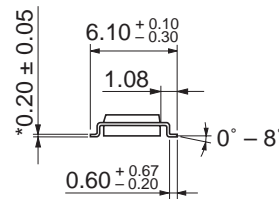
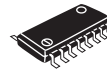
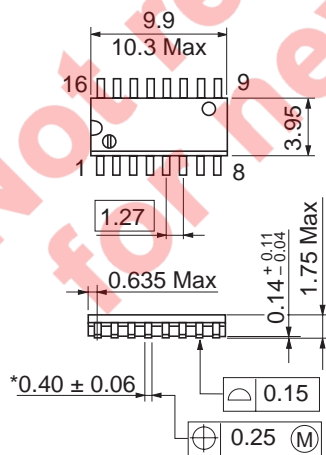
As of January, 2003
Unit: mm



Package Code	FP-16DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.24 g

*Ni/Pd/Au plating

As of January, 2003
Unit: mm



Package Code	FP-16DNV
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	0.15 g

*Ni/Pd/Au plating

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