To all our customers

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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HD74HC4022

Octal Counters/Dividers

ADE-205-532 (Z)
1st. Edition
Sep. 2000

Description

The HD74HC4022 is a four-stage Johson octal counter with built-in code converter. High speed operation and spike-free outputs are obtained by use of a Johson octal counter design. The eight decoded outputs are normally low, and go high only at their appropriate octal time period. The output changes occur on the positive-going edge of the clock pulse. This part can be used in frequency division application as well as octal counter or octal decode display applications.

Features

- High Speed Operation
- High Output Current: Fanout of 10 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

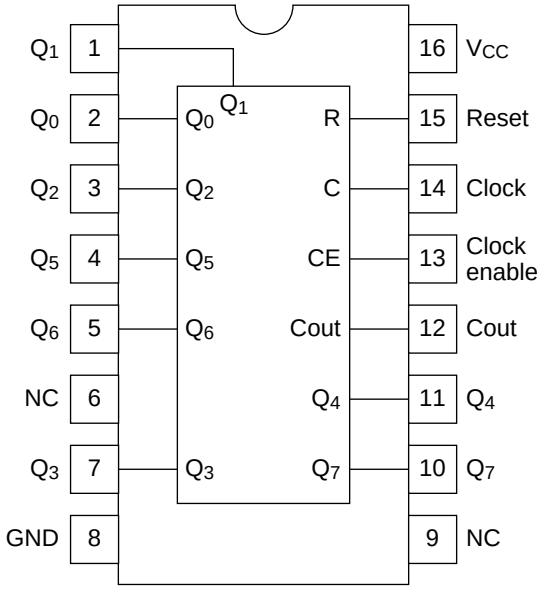
Clock	Clock Enable	Reset	Output n
L	X	L	n
X	H	L	n
⎍	L	L	n + 1
⎏	X	L	n
H	⎏	L	n + 1
X	⎍	L	n
X	X	H	Q_0

X: Irrelevant

n < 4 ⋯ Carry = H

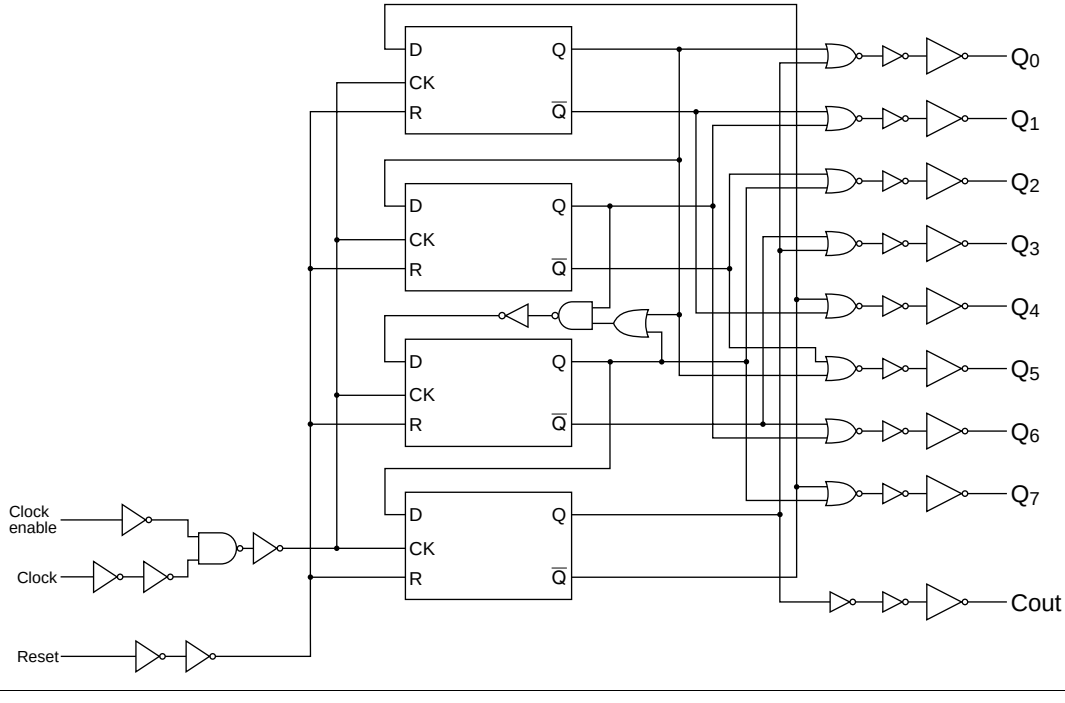
n ≥ 4 ⋯ Carry = L

Pin Arrangement



(Top view)

Logic Diagram



DC Characteristics

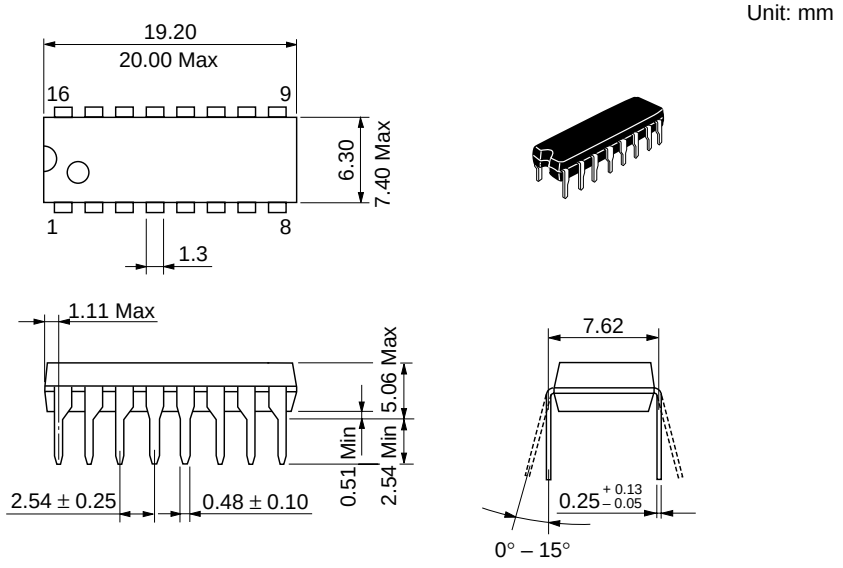
Item	Symbol	V_{CC} (V)	Ta = 25°C Min	Typ	Max	Ta = –40 to +85°C Min	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V	
		4.5	3.15	—	—	3.15	—		
		6.0	4.2	—	—	4.2	—		
	V_{IL}	2.0	—	—	0.5	—	0.5	V	
		4.5	—	—	1.35	—	1.35		
		6.0	—	—	1.8	—	1.8		
Output voltage	V_{OH}	2.0	1.9	2.0	—	1.9	—	V	Vin = 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} = –4 mA
		6.0	5.68	—	—	5.63	—		I_{OH} = –5.2 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} = 4 mA
		6.0	—	—	0.26	—	0.33		I_{OL} = 5.2 mA
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	—	—	6	—	5	MHz	
		4.5	—	—	31	—	27		
		6.0	—	—	36	—	31		
Propagation delay time	t_{PLH}	2.0	—	—	230	—	290	ns	Clock to Q
	t_{PHL}	4.5	—	19	46	—	58		
		6.0	—	—	39	—	49		
	t_{PLH}	2.0	—	—	230	—	290	ns	Reset to Q
	t_{PHL}	4.5	—	16	46	—	58		
		6.0	—	—	39	—	49		
	t_{PLH}	2.0	—	—	230	—	290	ns	Clock to Cout
	t_{PHL}	4.5	—	—	46	—	58		
		6.0	—	—	39	—	49		
	t_{PLH}	2.0	—	—	230	—	290	ns	Reset to Cout
	t_{PHL}	4.5	—	13	46	—	58		
		6.0	—	—	39	—	49		
Pulse width	t_w	2.0	80	—	—	100	—	ns	
		4.5	16	7	—	20	—		
		6.0	14	—	—	17	—		
Setup time	t_{su}	2.0	50	—	—	65	—	ns	
		4.5	10	—	—	13	—		
		6.0	9	—	—	11	—		
Hold time	t_h	2.0	75	—	—	95	—	ns	
		4.5	15	—	—	19	—		
		6.0	13	—	—	16	—		
Removal time	t_{rem}	2.0	75	—	—	95	—	ns	
		4.5	15	–3	—	19	—		
		6.0	13	—	—	16	—		
Output rise/fall time	t_{TLH}	2.0	—	—	75	—	95	ns	
	t_{THL}	4.5	—	—	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	Cin	—	—	5	10	—	10	pF	

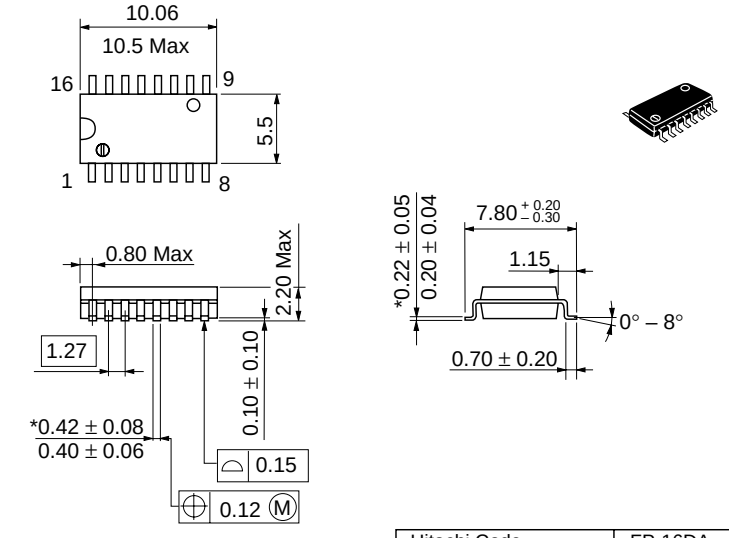
Package Dimensions

Unit: mm



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

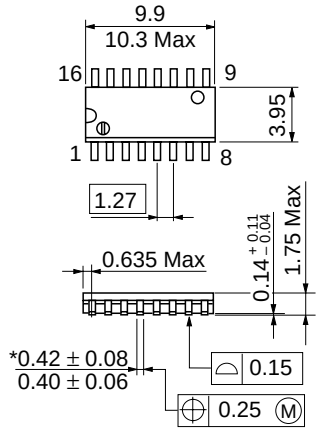
Unit: mm

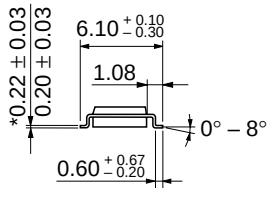


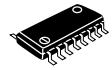
*Dimension including the plating thickness
Base material dimension

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

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