

# HD74HC4022

## Octal Counters/Dividers

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### Description

The HD74HC4022 is a four-stage Johnson octal counter with built-in code converter. High speed operation and spike-free outputs are obtained by use of a Johnson 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  $\mu\text{A}$  max
- Low Quiescent Supply Current:  $I_{CC}(\text{static}) = 4 \mu\text{A}$  max ( $T_a = 25^\circ\text{C}$ )

### 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	$Q_0$

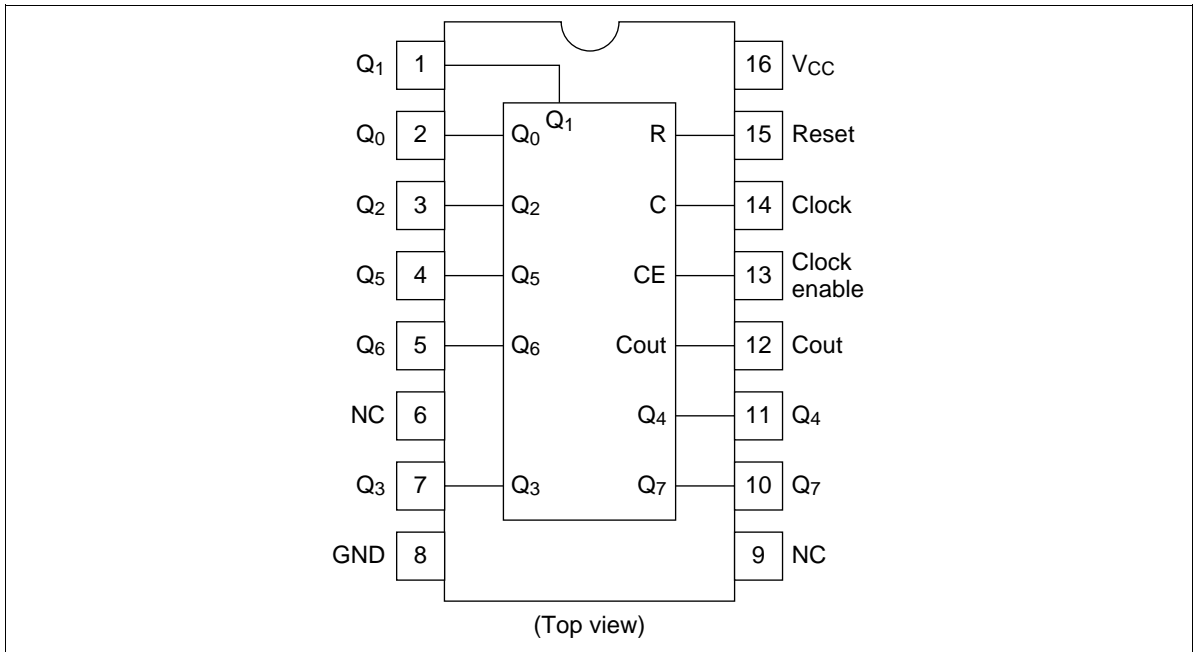
X: Irrelevant

$n < 4 \dots$  Carry = H

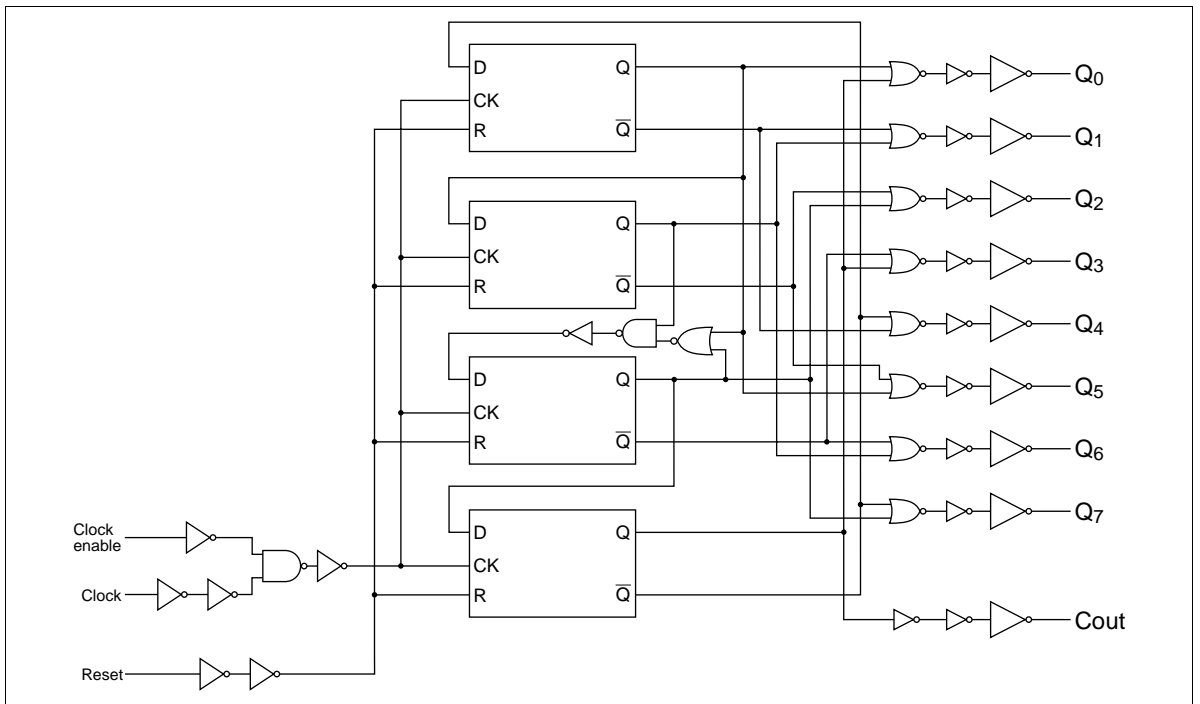
$n \geq 4 \dots$  Carry = L

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## Pin Arrangement



## Logic Diagram



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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> = -4 mA
		6.0	5.68	—	—	5.63	—			I <sub>OH</sub> = -5.2 mA
	V <sub>OL</sub>	2.0	—	0.0	0.1	—	0.1	V	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> = 4 mA
		6.0	—	—	0.26	—	0.33			I <sub>OL</sub> = 5.2 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	

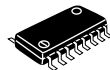
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## AC Characteristics ( $C_L = 50$ pF, Input $t_r = t_f = 6$ ns)

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	—	—	6	—	5	MHz	Clock to Q
		4.5	—	—	31	—	27		
		6.0	—	—	36	—	31		
Propagation delay time	$t_{PLH}$	2.0	—	—	230	—	290	ns	Clock to Q
		4.5	—	19	46	—	58		
		6.0	—	—	39	—	49		
	$t_{PHL}$	2.0	—	—	230	—	290	ns	Reset to Q
		4.5	—	16	46	—	58		
		6.0	—	—	39	—	49		
	$t_{PLH}$	2.0	—	—	230	—	290	ns	Clock to Cout
		4.5	—	—	46	—	58		
		6.0	—	—	39	—	49		
	$t_{PHL}$	2.0	—	—	230	—	290	ns	Reset to Cout
		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	$C_{in}$	—	—	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



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g

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