HD74HC4017

Decade Counter/Divider

HITACHI

Description

The HD74HC4017 is a 5-stage divide-by-10 Johnson counter with ten decoded outputs and a carry-out bit. High-speed operation and spike-free outputs are obtained by use of the Johnson decade counter configuration.

The ten decoded outputs are normally low and go high only at their respective decimal time periods. A high signal on Reset R asynchronously clears the decade counter and sets the carry output and Y_0 high. With $\overline{CE}$ low, the count is advanced on a low-to-high transition at C input. Alternatively, if C is high, the count is advanced on a high-to-low transition at $\overline{CE}$. Each decoded output remains high for one full clock cycle. The carry output is high while Q_0, Q_1, Q_2, Q_3 or Q_4 is high, then is low while Q_5, Q_6, Q_7, Q_8 or Q_9 is high.

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)

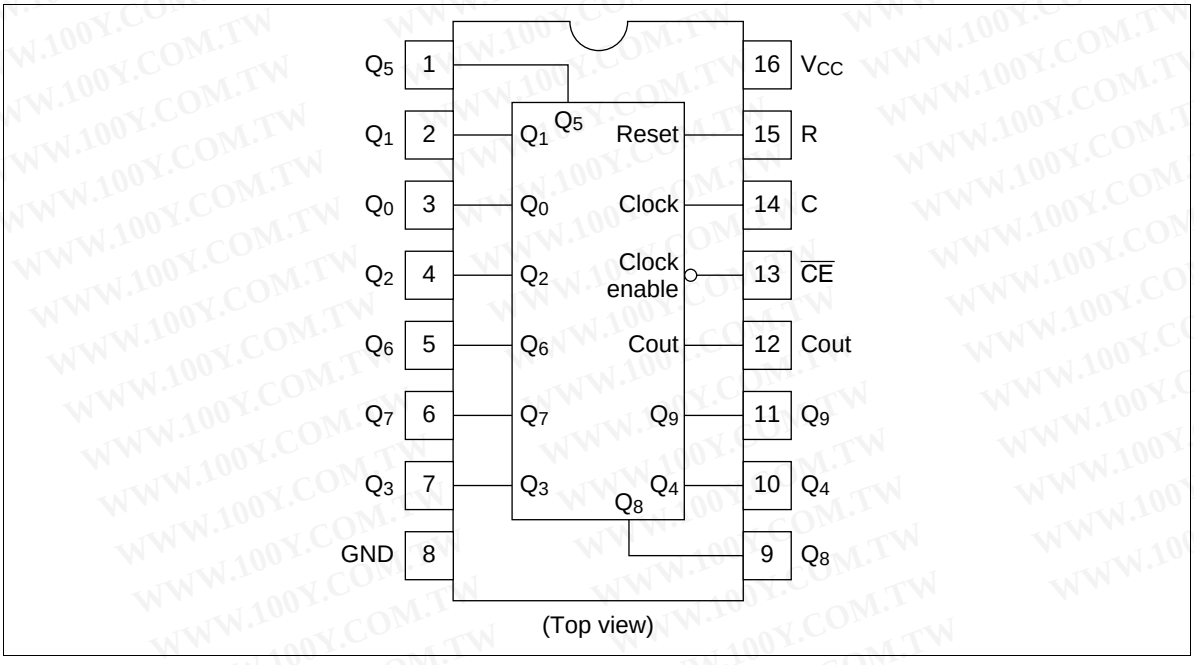
Hitachi semiconductor

Function Table

C	$\overline{CE}$	R	Decode Output = n
L	X	L	n
X	H	L	n
X	X	H	Q_0
⎍	L	L	n + 1
⎎	X	L	n
X	⎍	L	n
H	⎎	L	n + 1

Notes: 1. X: Don't care
2. If n < 5 Carry = "H", Otherwise = "L"

Pin Arrangement



(Top view)

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

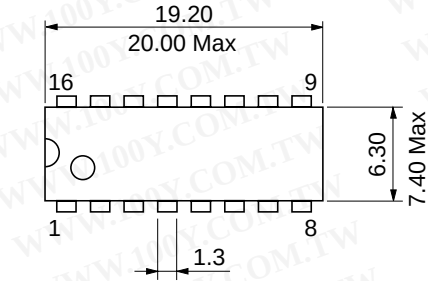
AC Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns)

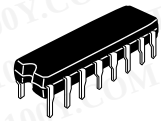
Item	Symbol	V_{CC} (V)	Ta = 25°C Min	Typ	Max	Ta = –40 to +85°C Min	Max	Unit	Test Conditions
Maximum clock frequency	f_{max}	2.0	—	—	6	—	5	MHz	
		4.5	—	—	31	—	27		
		6.0	—	—	36	—	31		
Propagation delay time	t_{PLH}	2.0	—	—	230	—	290	ns	C to Q
	t_{PHL}	4.5	—	20	46	—	58		
		6.0	—	—	39	—	49		

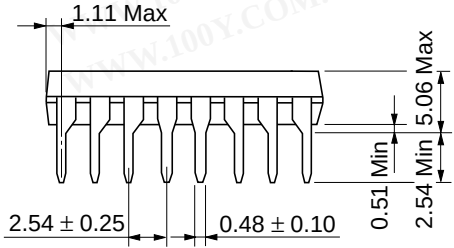
AC Characteristics (C_L = 50 pF, Input $t_r = t_f$ = 6 ns) (cont)

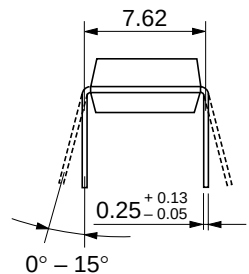
			Ta = 25°C			Ta = –40 to +85°C			
Item	**Symbol**	**V_{CC} (V)**	**Min**	**Typ**	**Max**	**Min**	**Max**	**Unit**	**Test Conditions**
Propagation delay time	t_{PLH}	2.0	—	—	230	—	290	ns	C to Cout
	t_{PHL}	4.5	—	19	46	—	58		
		6.0	—	—	39	—	49		
	t_{PLH}	2.0	—	—	250	—	315	ns	$\overline{CE}$ to Q
	t_{PHL}	4.5	—	21	50	—	63		
		6.0	—	—	43	—	54		
	t_{PLH}	2.0	—	—	250	—	315	ns	$\overline{CE}$ to Cout
	t_{PHL}	4.5	—	20	50	—	63		
		6.0	—	—	43	—	54		
	t_{PLH}	2.0	—	—	230	—	290	ns	R to Q
	t_{PHL}	4.5	—	18	46	—	58		
		6.0	—	—	39	—	49		
	t_{PLH}	2.0	—	—	230	—	290	ns	R 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	5	—	20	—		
		6.0	14	—	—	17	—		
Setup time	t_{su}	2.0	75	—	—	95	—	ns	
		4.5	15	5	—	19	—		
		6.0	13	—	—	16	—		
Hold time	t_h	2.0	50	—	—	65	—	ns	
		4.5	10	4	—	13	—		
		6.0	9	—	—	11	—		
Removal time	t_{rem}	2.0	100	—	—	125	—	ns	
		4.5	20	–3	—	25	—		
		6.0	17	—	—	21	—		
Output rise/fall time	t_{TLH}	2.0	—	—	75	—	95	ns	
	t_{THL}	4.5	—	6	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	Cin	—	—	5	10	—	10	pF	

Unit: mm



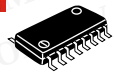


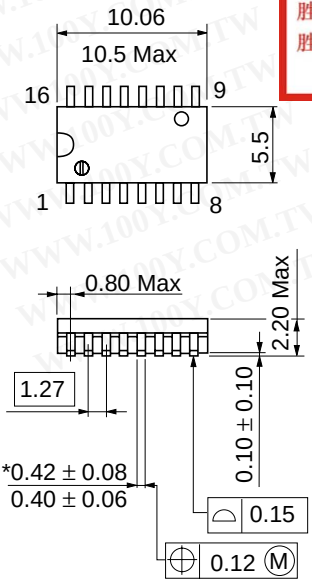


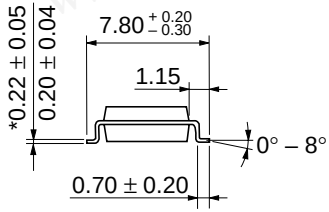


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g

Unit: mm



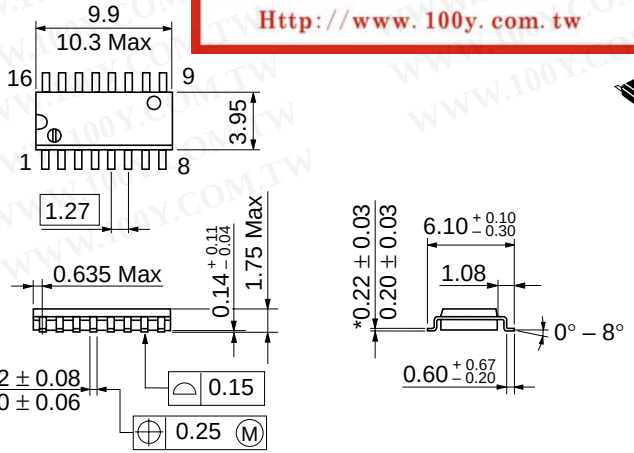


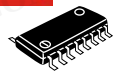


*Dimension including the plating thickness
Base material dimension

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

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

HITACHI