To our customers,

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

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

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

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HD74HC490

Dual 4-bit Decade Counters

ADE-205-507 (Z)
1st. Edition
Sep. 2000

Description

This circuit contains eight master-slave flip-flops and additional gating to implement two individual 4-bit decade counters. Each decade counter has individual clock, clear and set-to-9 inputs. BCD count sequences of any length up to divide-by-100 may be implemented with a single HD74HC490. Buffering on each output is provided to ensure that suceptibility to collector communication is reduced significantly. The counters have paralle outputs from each counter state so that submultiples of the input count frequency are available for system timing signals.

Features

- High Speed Operation: t_{pd} (Clock to Q_A) = 13 ns typ (C_L = 50 pF)
- 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

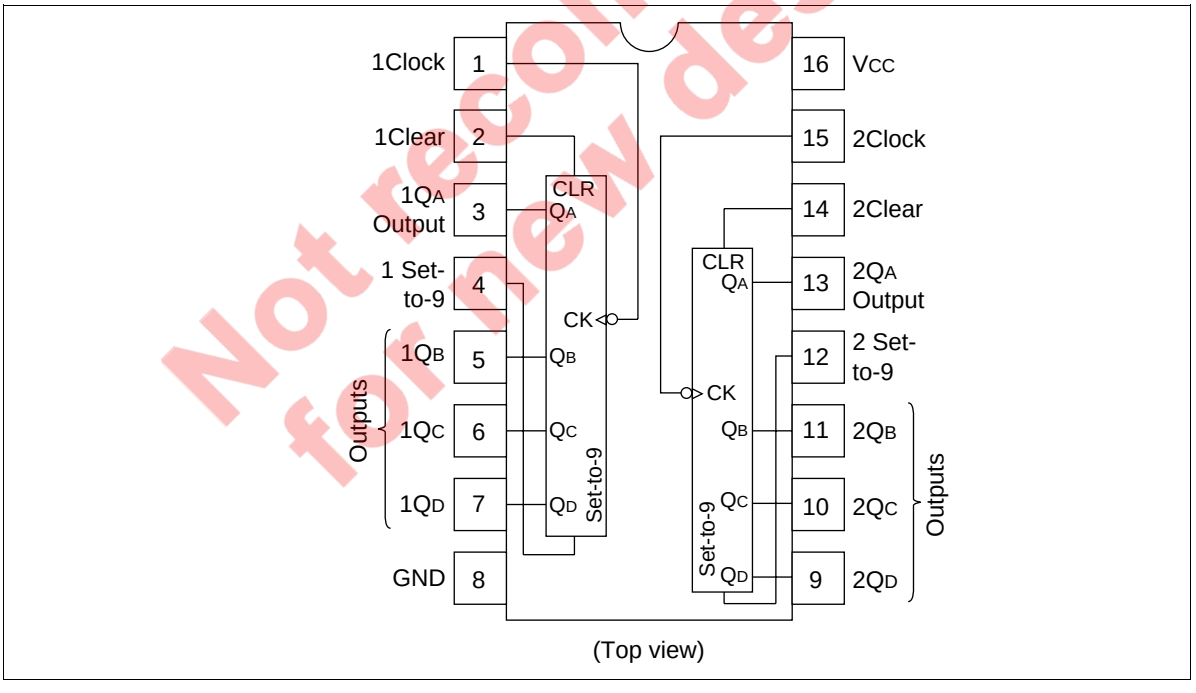
Clear/Set-To-9

Inputs		Outputs			
Clear	**Set-To-9**	**Q_A**	**Q_B**	**Q_C**	**Q_D**
H	L	L	L	L	L
L	H	H	L	L	H
L	L	Count			

BCD Count Sequence

	Outputs			
Count	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H

Pin Arrangement



(Top view)

DC Characteristics

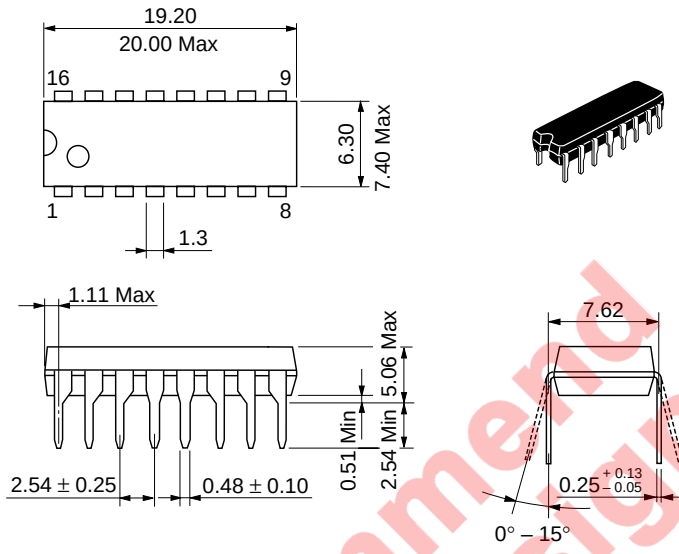
Item	Symbol	V_{CC} (V)	Ta = 25°C Min	Typ	Max	Ta = –40 to +85°C Min	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V	
		4.5	3.15	—	—	3.15	—		
		6.0	4.2	—	—	4.2	—		
	V_{IL}	2.0	—	—	0.5	—	0.5	V	
		4.5	—	—	1.35	—	1.35		
		6.0	—	—	1.8	—	1.8		
Output voltage	V_{OH}	2.0	1.9	2.0	—	1.9	—	V	Vin = 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)

			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	—	—	4	—	3	MHz	
		4.5	—	—	20	—	16		
		6.0	—	—	24	—	19		
Propagation delay time	t_{PLH} t_{PHL}	2.0	—	—	120	—	150	ns	Clock to Q_A
		4.5	—	13	24	—	30		
		6.0	—	—	20	—	26		
	t_{PLH} t_{PHL}	2.0	—	—	205	—	255	ns	Clock to Q_B Q_C
		4.5	—	21	41	—	51		
		6.0	—	—	35	—	43		
	t_{PLH} t_{PHL}	2.0	—	—	280	—	350	ns	Clock to Q_C
		4.5	—	23	56	—	70		
		6.0	—	—	48	—	60		
	t_{PHL}	2.0	—	—	205	—	255	ns	Clear to any output
		4.5	—	18	41	—	51		
		6.0	—	—	35	—	43		
	t_{PLH}	2.0	—	—	205	—	255	ns	Set-to-9 to Q_A, Q_D
		4.5	—	13	41	—	51		
		6.0	—	—	35	—	43		
	t_{PHL}	2.0	—	—	190	—	240	ns	Set-to-9 to Q_B, Q_C
		4.5	—	17	38	—	48		
		6.0	—	—	32	—	41		
Pulse width	t_w	2.0	80	—	—	100	—	ns	
		4.5	16	6	—	20	—		
		6.0	14	—	—	17	—		
Setup time	t_{su}	2.0	100	—	—	125	—	ns	
		4.5	20	1	—	25	—		
		6.0	17	—	—	21	—		
Output rise/fall time	t_{TLH} t_{THL}	2.0	—	—	75	—	95	ns	
		4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	Cin	—	—	5	10	—	10	pF	

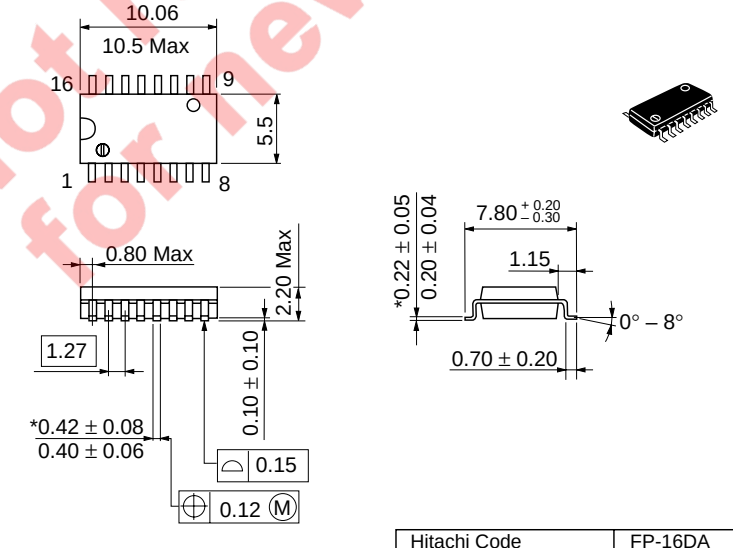
Package Dimensions

Unit: mm



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

Unit: mm



Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.24 g

*Dimension including the plating thickness
Base material dimension

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