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

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Keep safety first in your circuit designs!

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

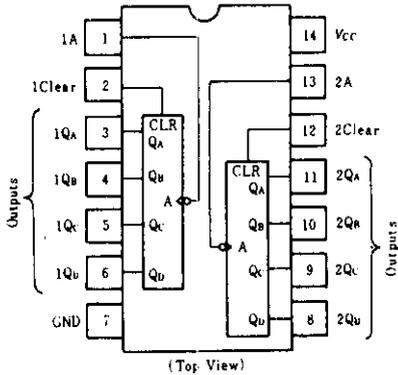
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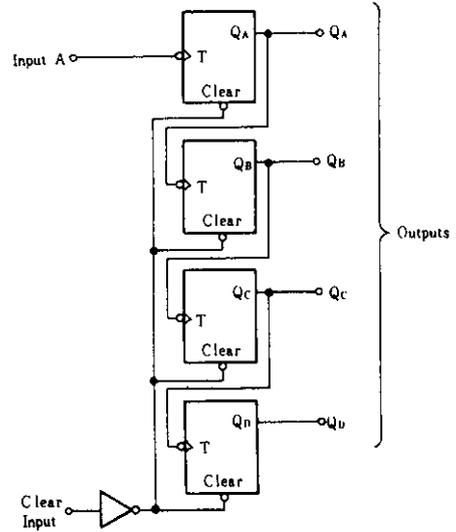
HD74LS393 ● Dual 4-bit Binary Counters

This circuit contains eight master-slave flip-flops and additional gating to implement two individual four-bit counters. The HD74LS393 comprises two independent four-bit binary counters each having a clear and a clock input. N-bit binary counter can be implemented with each package providing the capability of divide-by-256.

■ PIN ARRANGEMENT



■ BLOCK DIAGRAM (1/2)



■ RECOMMENDED OPERATING CONDITIONS

Item	Symbol	min	typ	max	Unit
Output current	I_{OH}	—	—	-400	μA
Output current	I_{OL}	—	—	8	mA
Count frequency	A input f_{count}	0	—	25	MHz
Pulse width	A input high or low	t_w	20	—	ns
	Clear high	t_w	20	—	ns
Setup time	t_{su}	25↓	—	—	ns

↓; The arrow indicates that the falling edge of the clock pulse is used for reference.

■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rating	Unit
Supply voltage	V_{CC}	7	V
Input voltage	Clear	7	V
	A	5.5	V
Operating temperature range	T_{op}	-20 ~ +75	°C
Storage temperature range	T_{stg}	-65 ~ +150	°C

■ FUNCTION TABLE

Count	Output			
	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
10	H	L	H	L
11	H	L	H	H
12	H	H	L	L
13	H	H	L	H
14	H	H	H	L
15	H	H	H	H

H; high level, L; low level.

■ ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$)

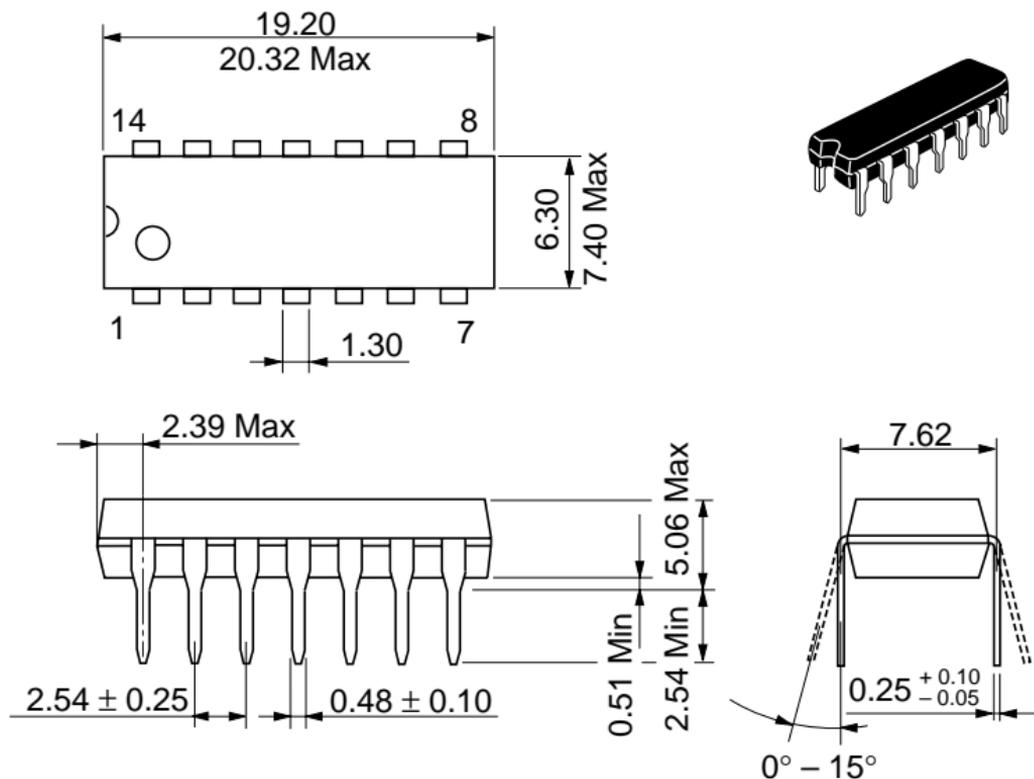
Item	Symbol	Test Conditions	min	typ*	max	Unit		
Input voltage	V_{IH}		2.0	—	—	V		
	V_{IL}		—	—	0.8			
Output voltage	V_{OH}	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$, $I_{OH}=-400\mu\text{A}$	2.7	—	—	V		
	V_{OL}	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$	$I_{OL}=4\text{mA}$	—	—	0.4	V	
			$I_{OL}=8\text{mA}$	—	—	0.5		
Input current	Clear	I_i	$V_{CC}=5.25\text{V}$	$V_i=7\text{V}$	—	—	0.1	mA
	Input A			$V_i=5.5\text{V}$	—	—	0.2	
	Clear	I_{IH}	$V_{CC}=5.25\text{V}$, $V_i=2.7\text{V}$	—	—	20	μA	
	Input A			—	—	100		
	Clear	I_{iL}	$V_{CC}=5.25\text{V}$, $V_i=0.4\text{V}$	—	—	-0.4	mA	
Input A	—			—	-1.6			
Short-circuit output current	I_{OS}	$V_{CC}=5.25\text{V}$	-20	—	-100	mA		
Supply current	I_{CC}^{**}	$V_{CC}=5.25\text{V}$	—	15	26	mA		
Input clamp voltage	V_{IK}	$V_{CC}=4.75\text{V}$, $I_{IK}=-18\text{mA}$	—	—	-1.5	V		

* $V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$

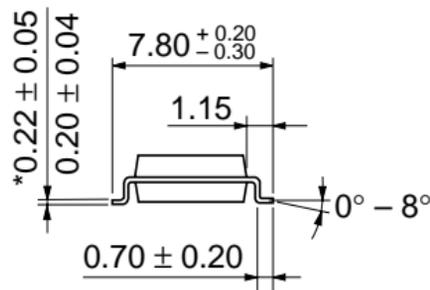
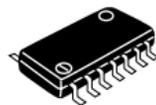
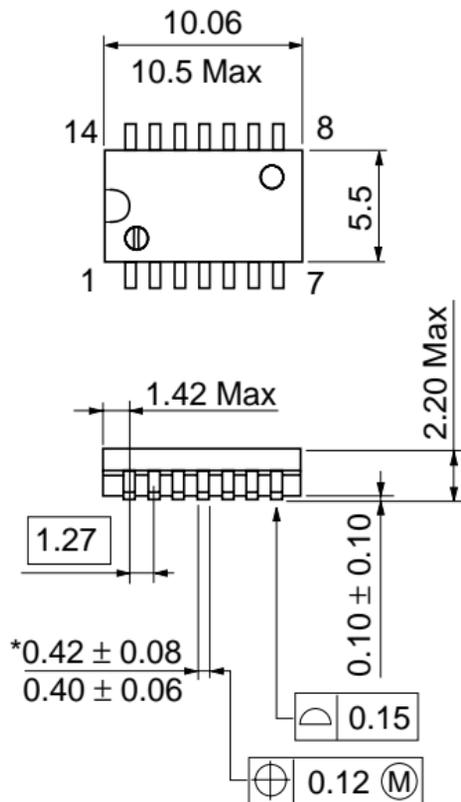
** I_{CC} is measured with all outputs open, both clear inputs grounded following momentary connection to 4.5V, and all other inputs grounded.

■ SWITCHING CHARACTERISTICS ($V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$)

Item	Symbol	Inputs	Outputs	Test Conditions	min	typ	max	Unit
Maximum count frequency	f_{max}	A	Q_A	$C_L=15\text{pF}$, $R_L=2\text{k}\Omega$	25	35	—	MHz
Propagation delay time	t_{PLH}	A	Q_A		—	12	20	ns
	t_{PHL}				—	13	20	
	t_{PLH}	A	Q_B		—	40	60	
	t_{PHL}				—	40	60	
	t_{PHL}				Clear	Any	—	

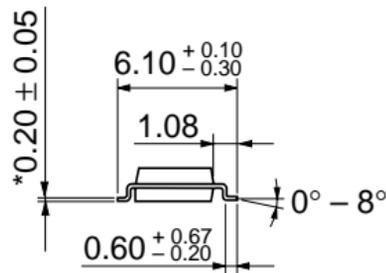
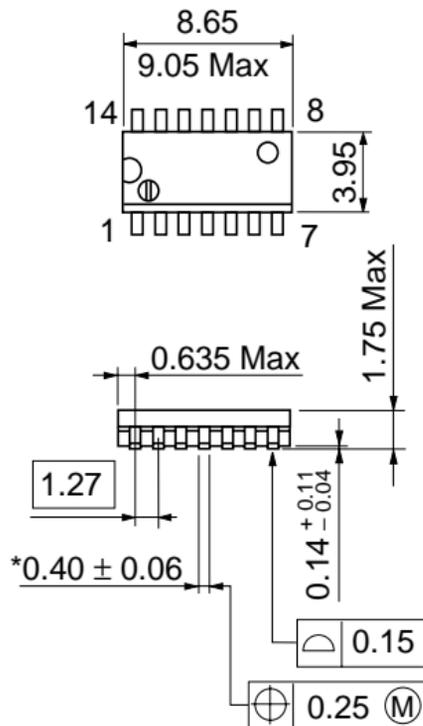


Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.97 g



Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.23 g

*Dimension including the plating thickness
Base material dimension



Hitachi Code	FP-14DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.13 g

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