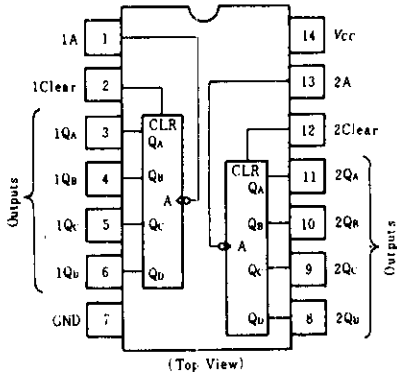


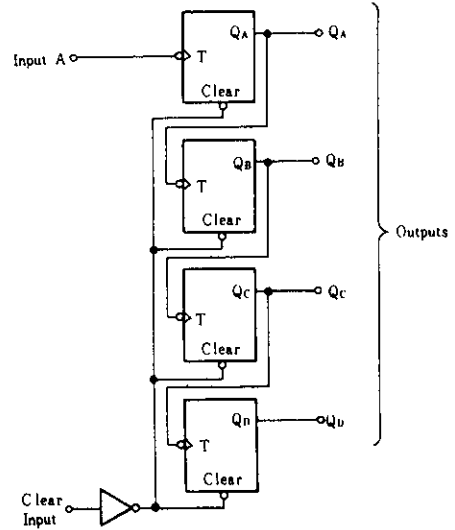
# HD74LS393 ● Dual 4-bit Binary Counters

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	$\mu A$
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	$\mu\text{A}$	
	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		

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

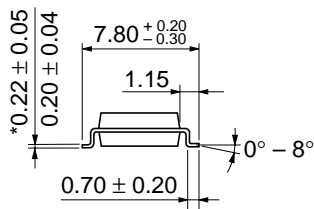
\*\*  $I_{CC}$  is measured with all outputs open, both clear inputs grounded following momentary connection to 4.5V, and all other inputs grounded.

## ■ 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		—	24	39	



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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