

# HD74LS393

## Dual 4-bit Binary Counters

REJ03D0486-0200  
Rev.2.00  
Feb.18.2005

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-258.

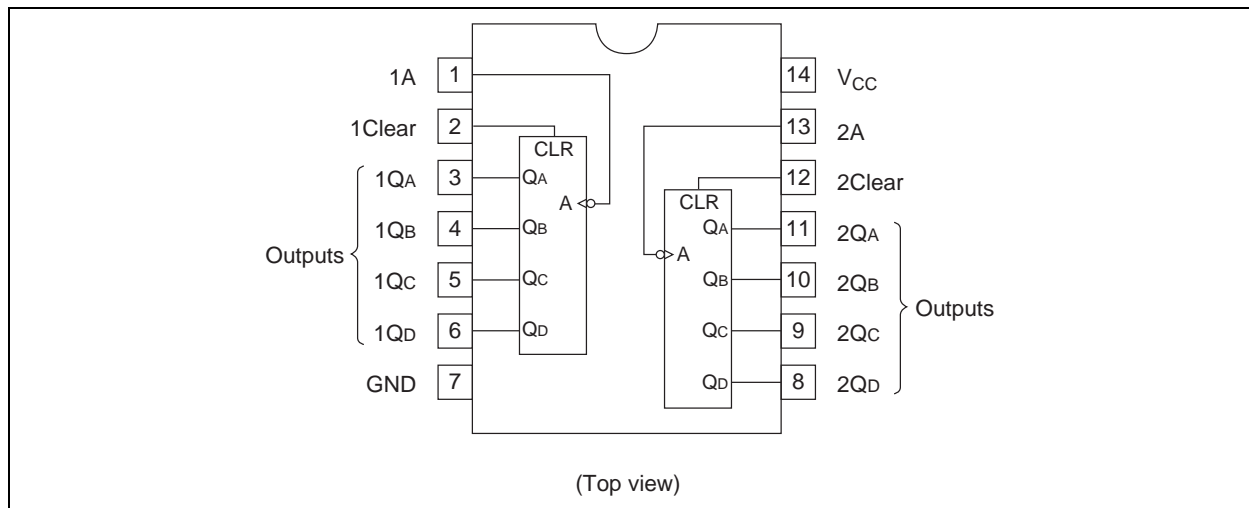
### Features

- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LS393P	DILP-14 pin	PRDP0014AB-B (DP-14AV)	P	—
HD74LS393FPEL	SOP-14 pin (JEITA)	PRSP0014DF-B (FP-14DAV)	FP	EL (2,000 pcs/reel)
HD74LS393RPEL	SOP-14 pin (JEDEC)	PRSP0014DE-A (FP-14DNV)	RP	EL (2,500 pcs/reel)

Note: Please consult the sales office for the above package availability.

### Pin Arrangement

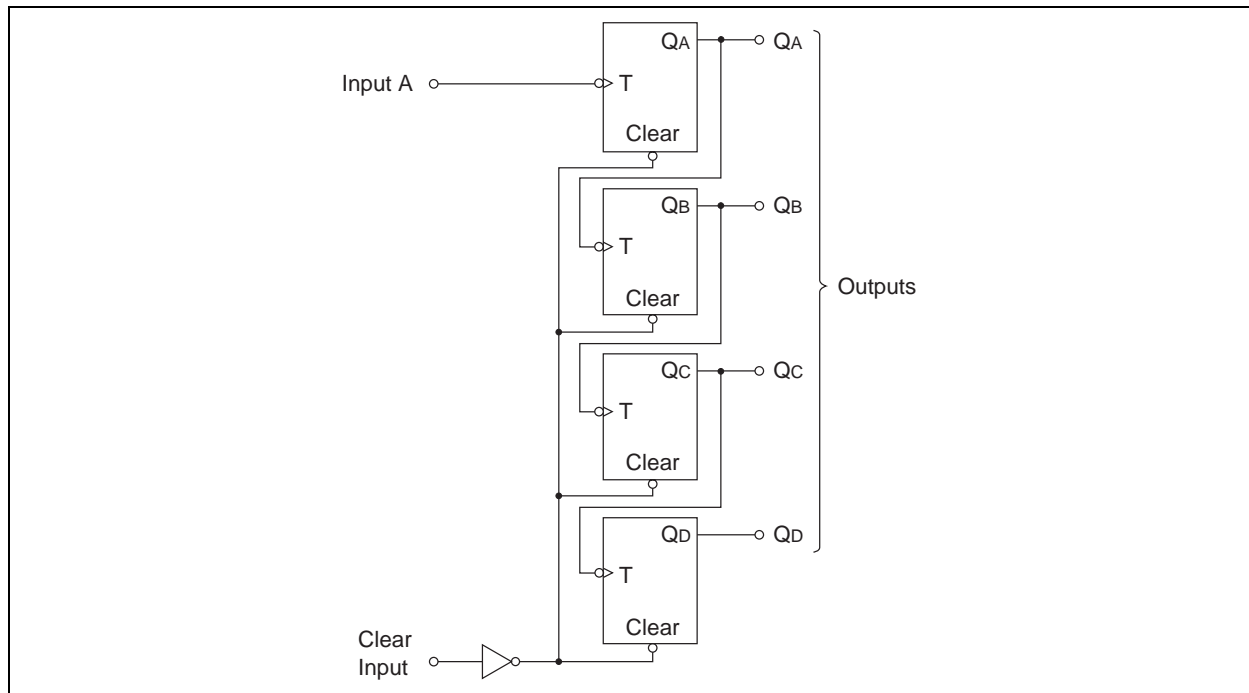


Function Table

Count	Output			
	Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>
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

Block Diagram (1/2)



### Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	$V_{CC}$	7	V
Input voltage	Clear	$V_{IN}$	7
	A	$V_{IN}$	5.5
Power dissipation	$P_T$	400	mW
Storage temperature	$T_{stg}$	-65 to +150	°C
Operating temperature	$T_{opr}$	-20 to +75	°C

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

### Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	$V_{CC}$	4.75	5.00	5.25	V
Output current	$I_{OH}$	—	—	-400	μA
	$I_{OL}$	—	—	8	mA
Operating temperature	$T_{opr}$	-20	—	75	°C
Count frequency	A input	$f_{count}$	0	—	25
Pulse width	A input high or low	$t_w$	20	—	—
	Clear high	$t_w$	20	—	—
Clear setup time	$t_{su}$	25↓	—	—	ns

### Electrical Characteristics

( $T_a = -20$  to  $+75$  °C)

Item	Symbol	min.	typ.*	max.	Unit	Condition
Input voltage	$V_{IH}$	2.0	—	—	V	
	$V_{IL}$	—	—	0.8	V	
Output voltage	$V_{OH}$	2.7	—	—	V	$V_{CC} = 4.75$ V, $V_{IH} = 2$ V, $V_{IL} = 0.8$ V, $I_{OH} = -400$ μA
	$V_{OL}$	—	—	0.4	V	$I_{OL} = 4$ mA, $V_{CC} = 4.75$ V, $V_{IH} = 2$ V, $V_{IL} = 0.8$ V
Input current	Clear	—	—	20	μA	$V_{CC} = 5.25$ V, $V_I = 2.7$ V
	Input A			100		
	Clear	—	—	-0.4	mA	
	Input A			-1.6		
Clear	—	—	0.1	mA	$V_I = 7$ V, $V_{CC} = 5.25$ V	
Input A			0.2			
Short-circuit output current	$I_{OS}$	-20	—	-100	mA	$V_{CC} = 5.25$ V
Supply current	$I_{CC}^{**}$	—	15	26	mA	$V_{CC} = 5.25$ V
Input clamp voltage	$V_{IK}$	—	—	-1.5	V	$V_{CC} = 4.75$ V, $I_{IN} = -18$ mA

Notes: \*  $V_{CC} = 5$  V,  $T_a = 25$ °C

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

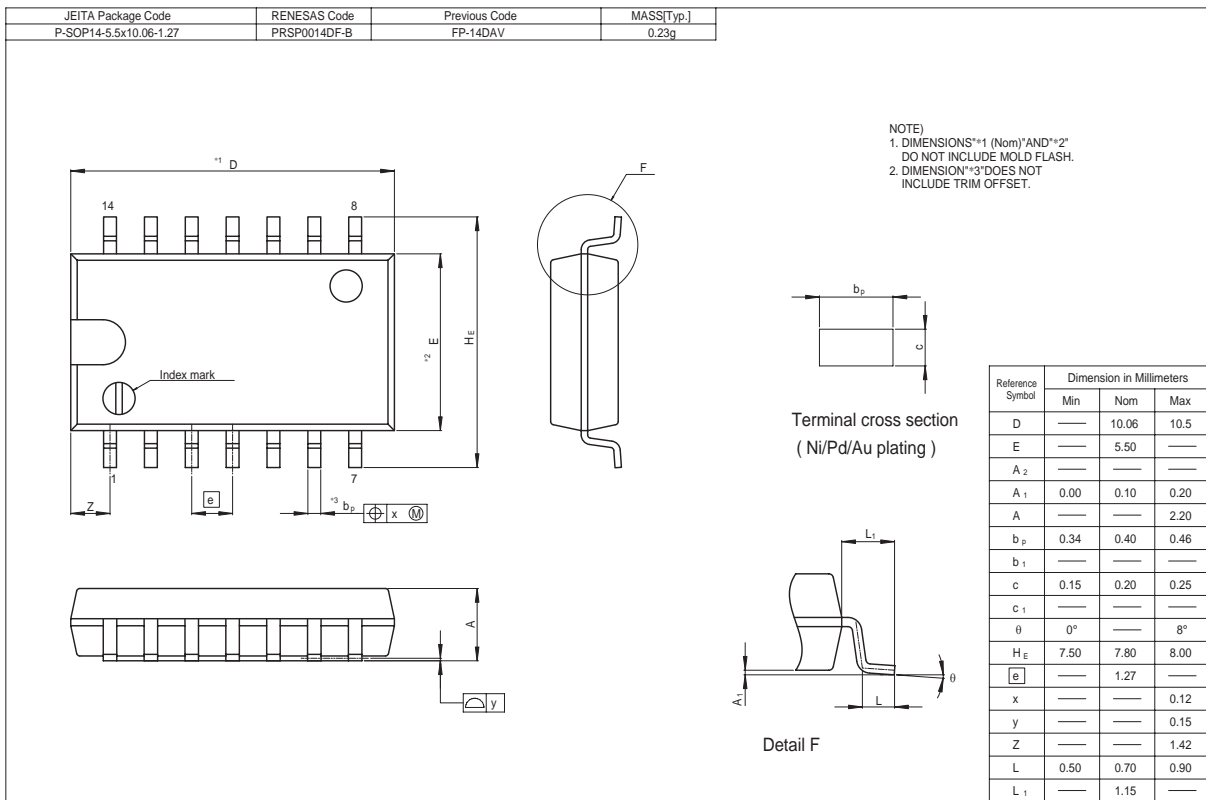
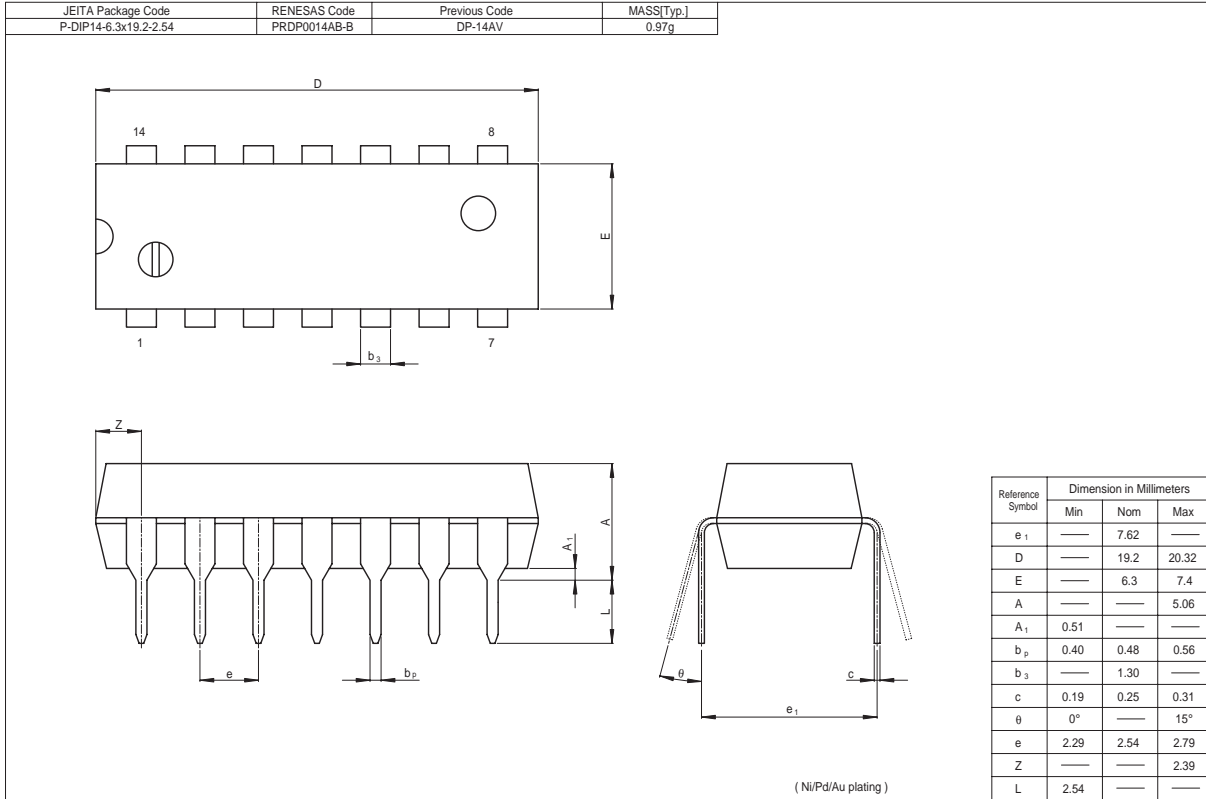
## Switching Characteristics

(V<sub>CC</sub> = 5 V, T<sub>a</sub> = 25°C)

Item	Symbol	Inputs	Outputs	min.	typ.	max.	Unit	Condition
Maximum count frequency	$f_{max}$	A	Q <sub>A</sub>	25	35	—	MHz	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 2 kΩ
Propagation delay time	t <sub>PLH</sub>	A	Q <sub>A</sub>	—	12	20	ns	
	t <sub>PHL</sub>			—	13	20		
	t <sub>PLH</sub>	A	Q <sub>D</sub>	—	40	60	ns	
	t <sub>PHL</sub>			—	40	60		
	t <sub>PHL</sub>	Clear	Any	—	24	39	ns	

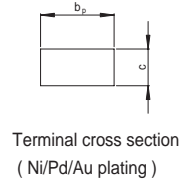
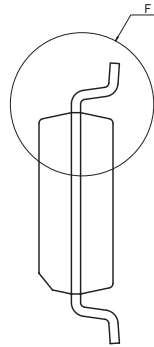
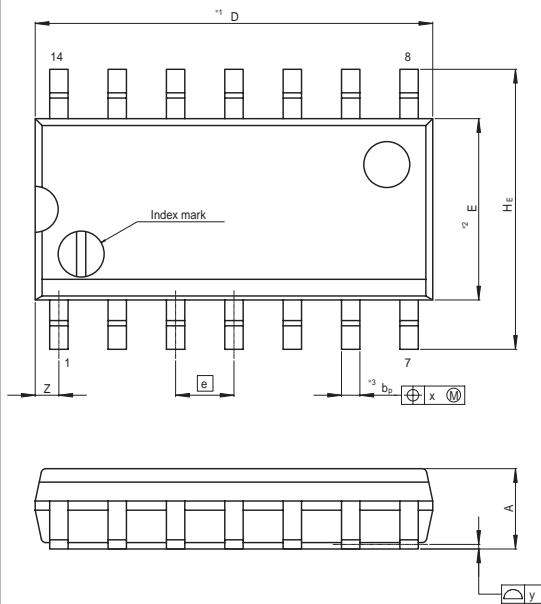
Note: Refer to Test Circuit and Waveform of the Common Item "TTL Common Matter (Document No.: REJ27D0005-0100)".

Package Dimensions

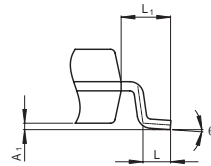


# HD74LS393

JEITA Package Code P-SOP14-3.95x8.65-1.27	RENESAS Code PRSP0014DE-A	Previous Code FP-14DNV	MASS[Typ.] 0.13g
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Terminal cross section  
( Ni/Pd/Au plating )



Detail F

NOTE)  
1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\*  
DO NOT INCLUDE MOLD FLASH.  
2. DIMENSION\*\*3\*DOES NOT  
INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	8.65	9.05
E	—	3.95	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.10	0.14	0.25
A	—	—	1.75
b <sub>p</sub>	0.34	0.40	0.46
b <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	5.80	6.10	6.20
e	—	1.27	—
x	—	—	0.25
y	—	—	0.15
Z	—	—	0.635
L	0.40	0.60	1.27
L <sub>1</sub>	—	1.08	—

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