

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.

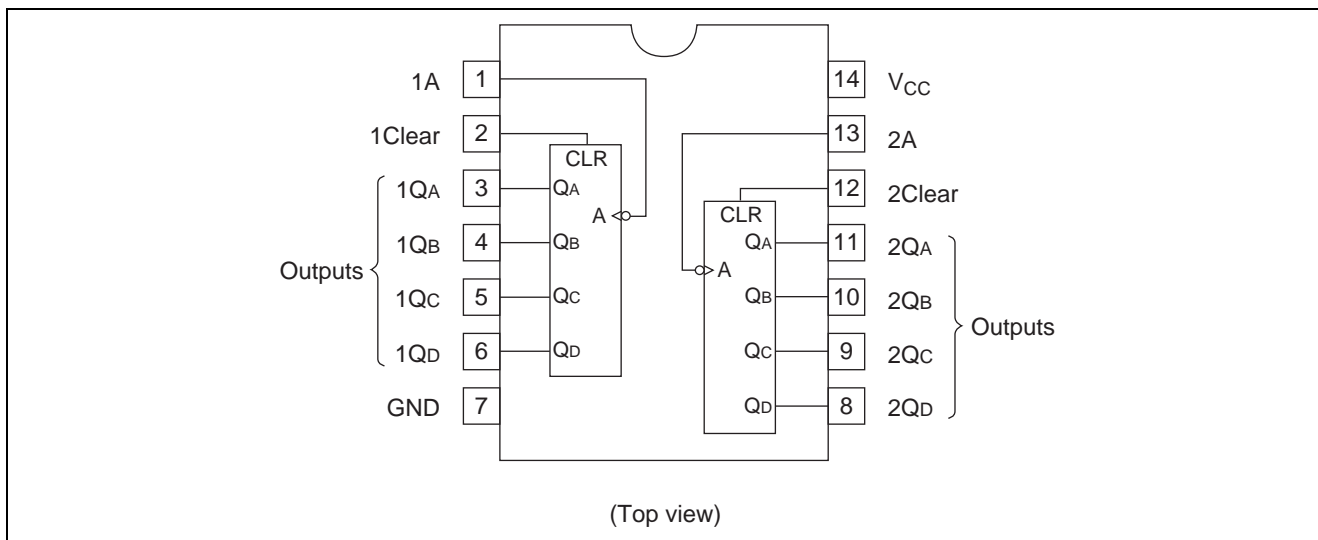
Features

- 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

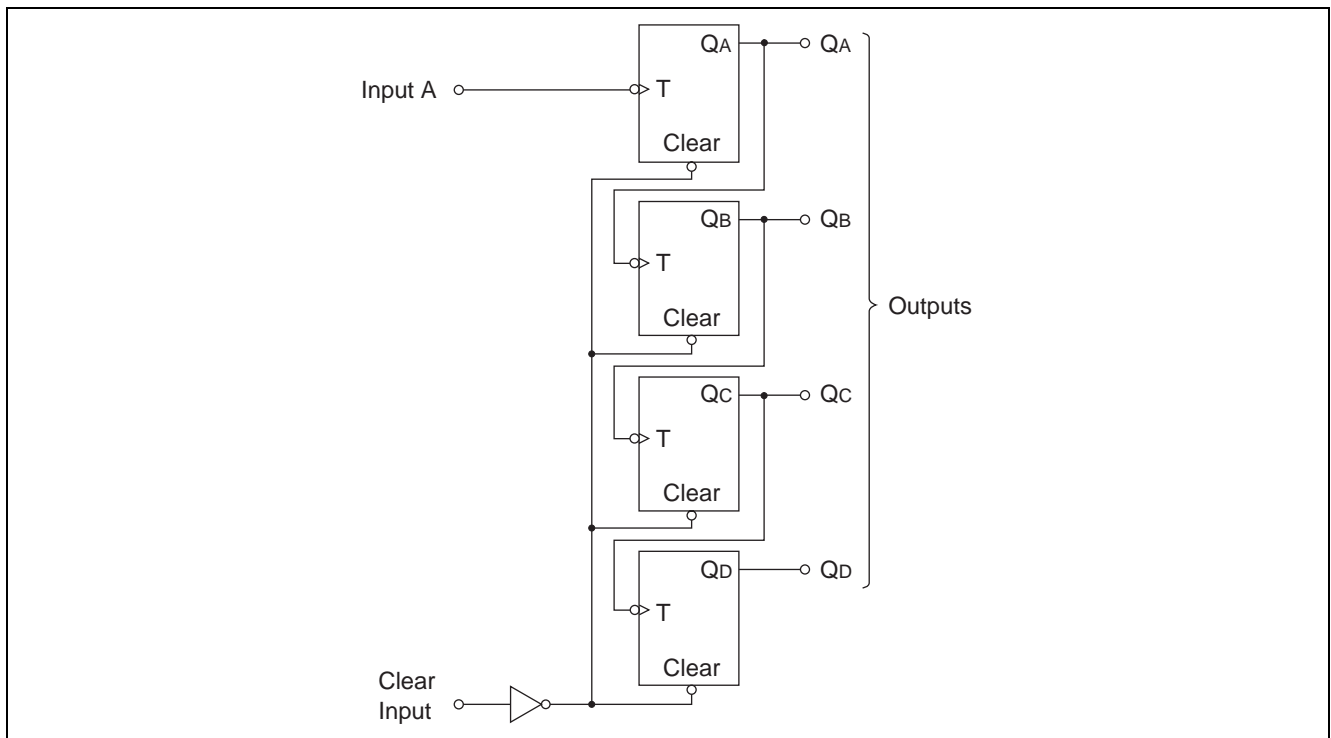


Function Table

Count	Output			
	Q _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

Block Diagram (1/2)



Absolute Maximum Ratings

Item		Symbol	Ratings	Unit
Supply voltage		V_{CC}	7	V
Input voltage	Clear	V_{IN}	7	V
	A	V_{IN}	5.5	V
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	MHz
Pulse width	A input high or low	t_w	20	—	—	ns
	Clear high		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	I_{IH}	—	—	20	μA	$V_{CC} = 5.25$ V, $V_I = 2.7$ V
	Input A		—	—	100		
	Clear	I_{IL}	—	—	-0.4	mA	$V_{CC} = 5.25$ V, $V_I = 0.4$ V
	Input A		—	—	-1.6		
	Clear	I_I	—	—	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.

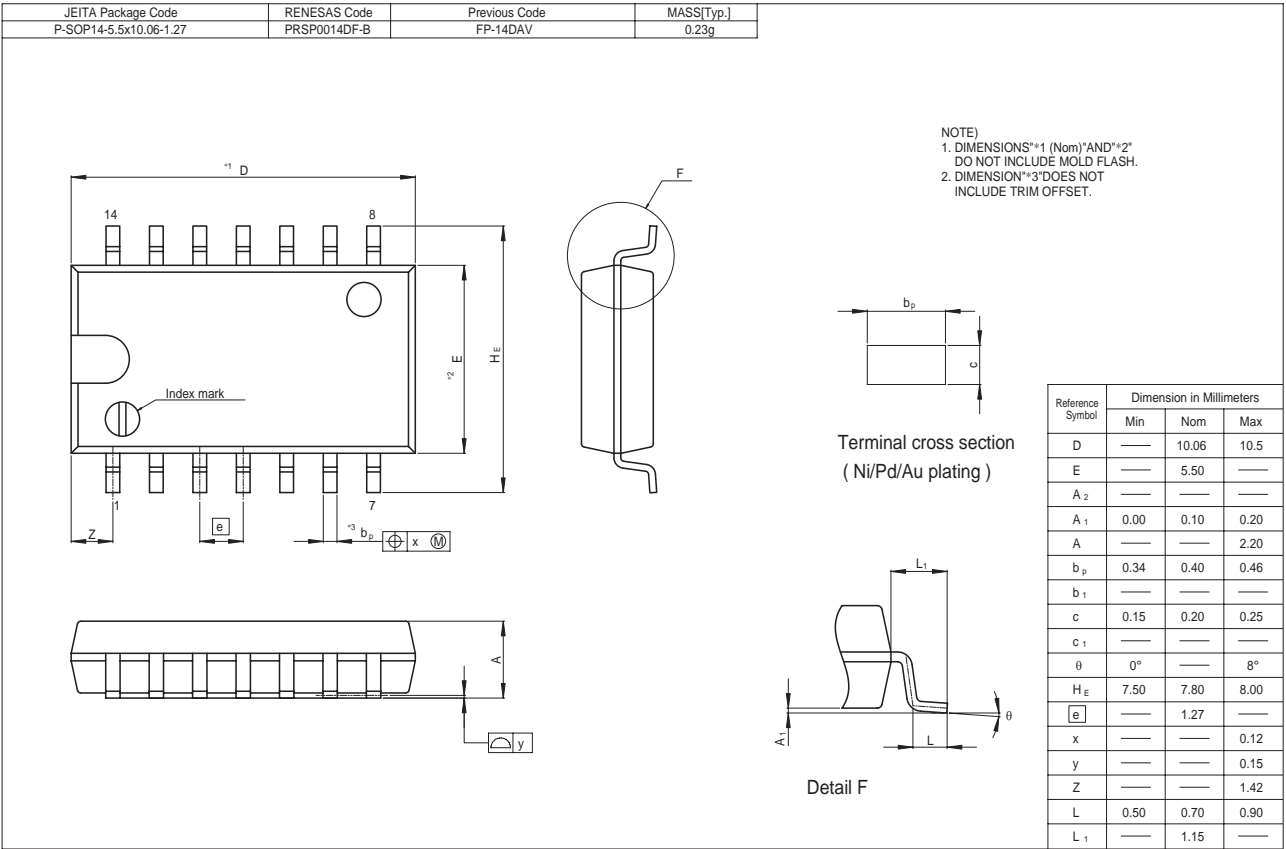
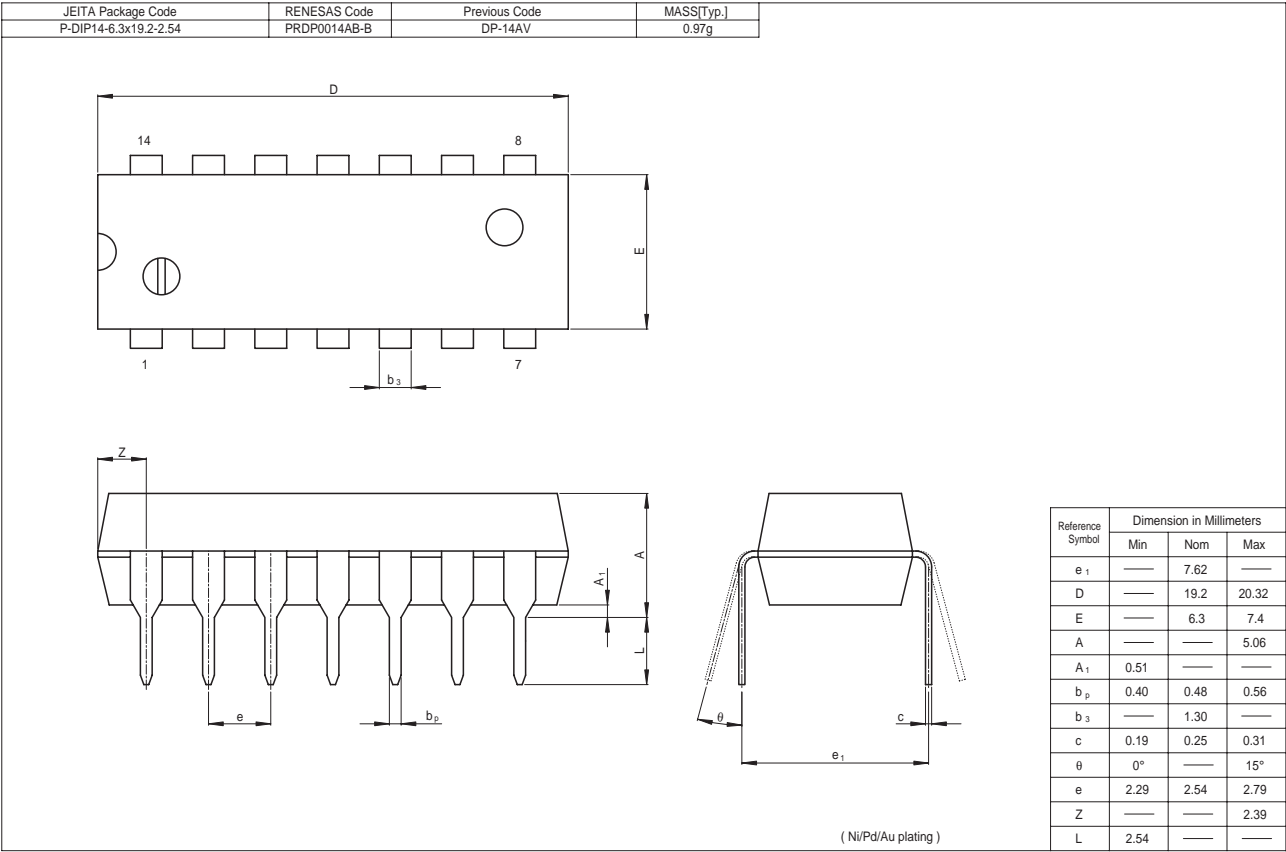
Switching Characteristics

(V_{CC} = 5 V, T_a = 25°C)

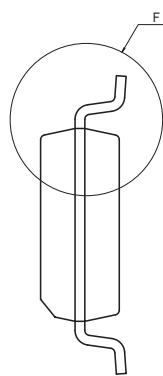
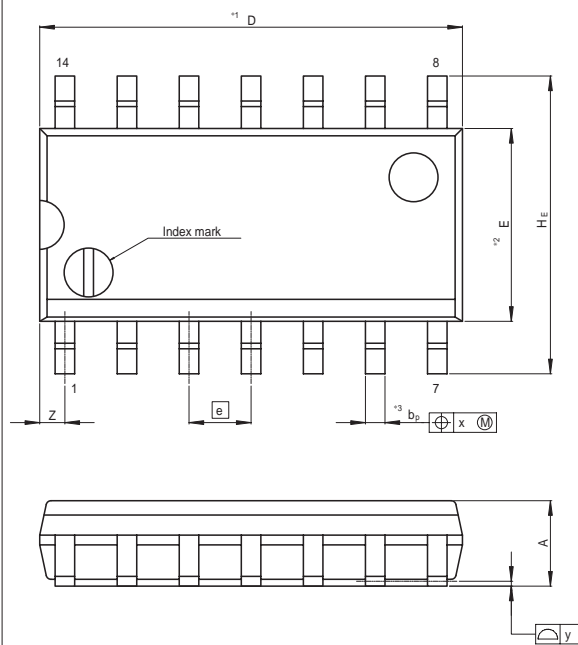
Item	Symbol	Inputs	Outputs	min.	typ.	max.	Unit	Condition
Maximum count frequency	f_{\max}	A	Q _A	25	35	—	MHz	C _L = 15 pF, R _L = 2 kΩ
Propagation delay time	t _{PLH}	A	Q _A	—	12	20	ns	
	t _{PHL}			—	13	20		
	t _{PLH}	A	Q _D	—	40	60	ns	
	t _{PHL}			—	40	60		
	t _{PHL}	Clear	Any	—	24	39	ns	

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

Package Dimensions

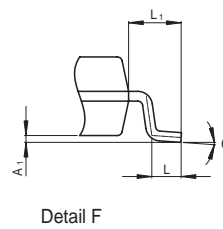


JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP14-3.95x8.65-1.27	PRSP0014DE-A	FP-14DNV	0.13g



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

Terminal cross section
(Ni/Pd/Au plating)



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	8.65	9.05
E	—	3.95	—
A ₂	—	—	—
A ₁	0.10	0.14	0.25
A	—	—	1.75
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	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 ₁	—	1.08	—

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