HD74LS393

Dual 4-bit Binary Counters

REJ03D0486–0200
Rev.2.00
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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.

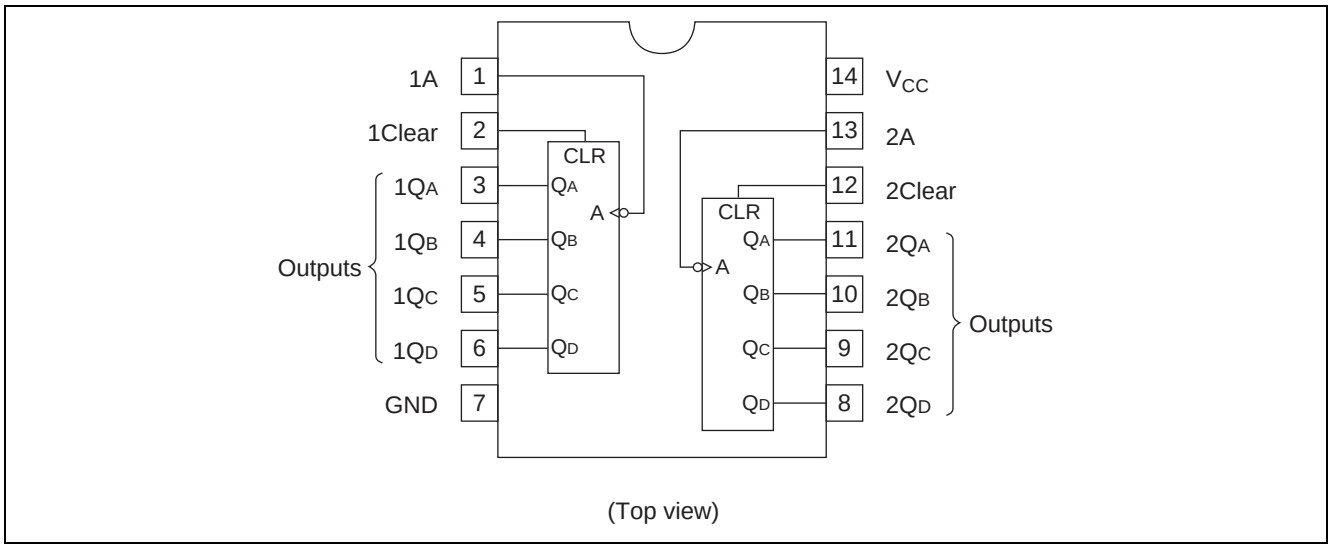
Features

- 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



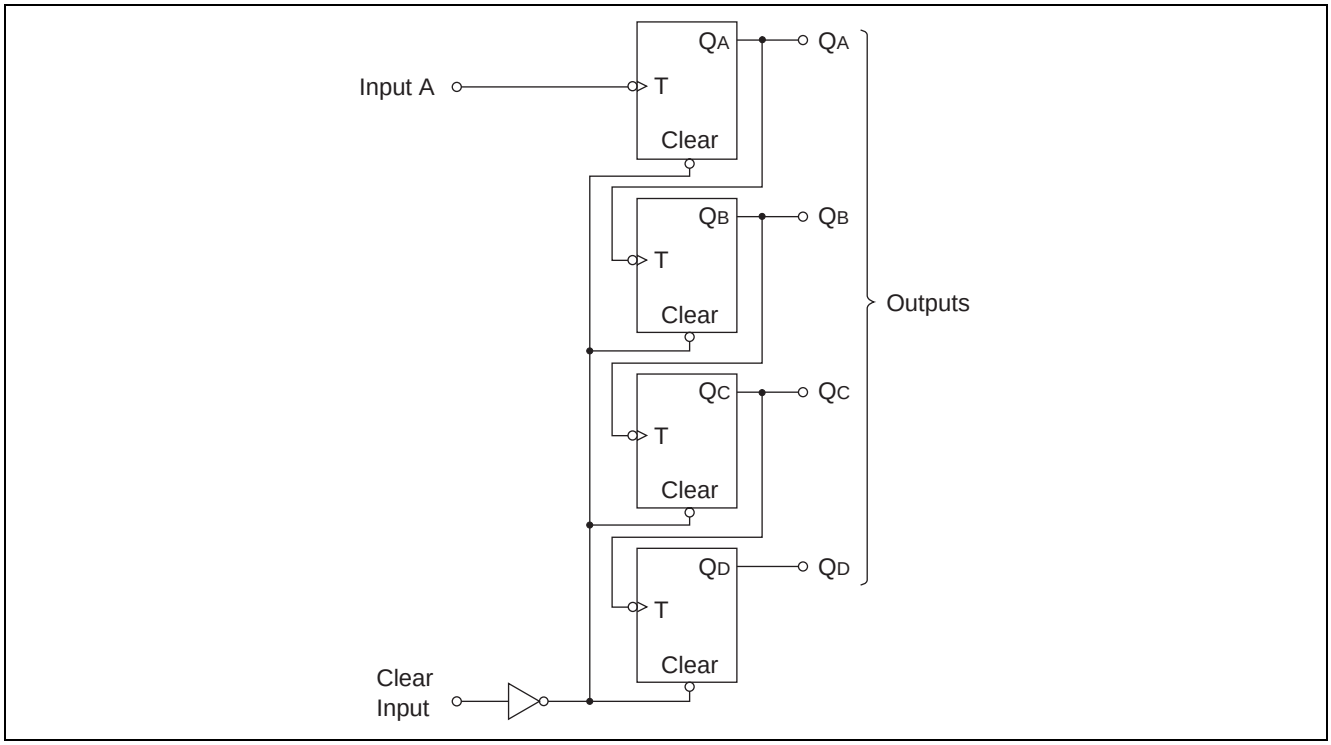
(Top view)

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		Tstg	–65 to +150	°C
Operating temperature		Topr	–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		Topr	–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

(Ta = –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
			—	—	0.5		I_{OL} = 8 mA	
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		V_I = 5.5 V	
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, Ta = 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

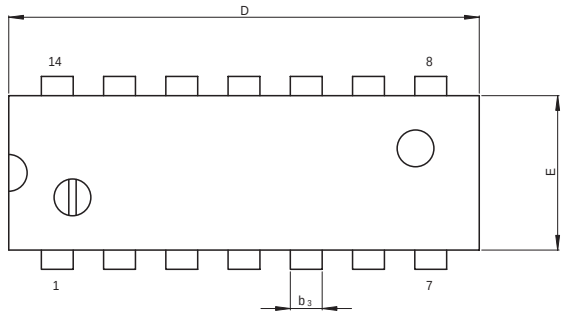
(V_{CC} = 5 V, Ta = 25°C)

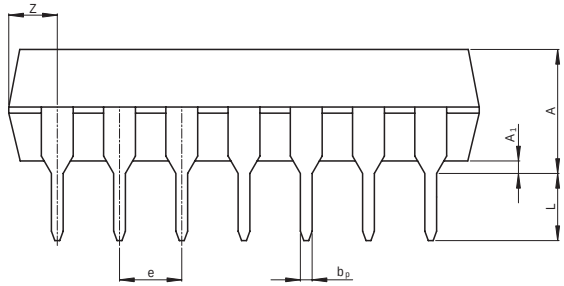
Item	Symbol	Inputs	Outputs	min.	typ.	max.	Unit	Condition
Maximum count frequency	f_{max}	A	Q_A	25	35	—	MHz	C_L = 15 pF, R_L = 2 kΩ
Propagation delay time	t_{PLH}	A	Q_A	—	12	20	ns	
	t_{PHL}			—	13	20		
	t_{PLH}	A	Q_D	—	40	60	ns	
	t_{PHL}			—	40	60		
	t_{PHL}	Clear	Any	—	24	39	ns	

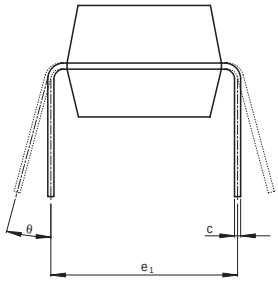
Note: Refer to Test Circuit and Waveform of the Common Item "TTL Common Matter (Document No.: REJ27D0005-0100)".

Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP14-6.3x19.2-2.54	PRDP0014AB-B	DP-14AV	0.97g



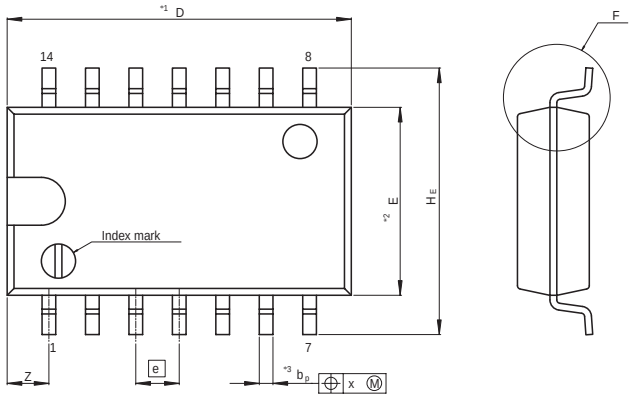


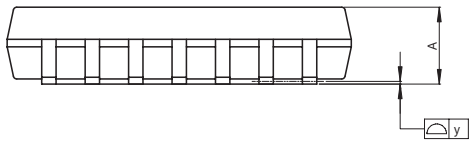


(Ni/Pd/Au plating)

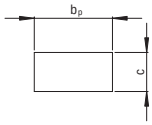
Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e_1	——	7.62	——
D	——	19.2	20.32
E	——	6.3	7.4
A	——	——	5.06
A_1	0.51	——	——
b_p	0.40	0.48	0.56
b_3	——	1.30	——
c	0.19	0.25	0.31
θ	0°	——	15°
e	2.29	2.54	2.79
Z	——	——	2.39
L	2.54	——	——

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP14-5.5x10.06-1.27	PRSP0014DF-B	FP-14DAV	0.23g

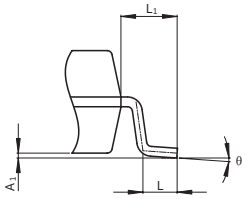




NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT INCLUDE TRIM OFFSET.



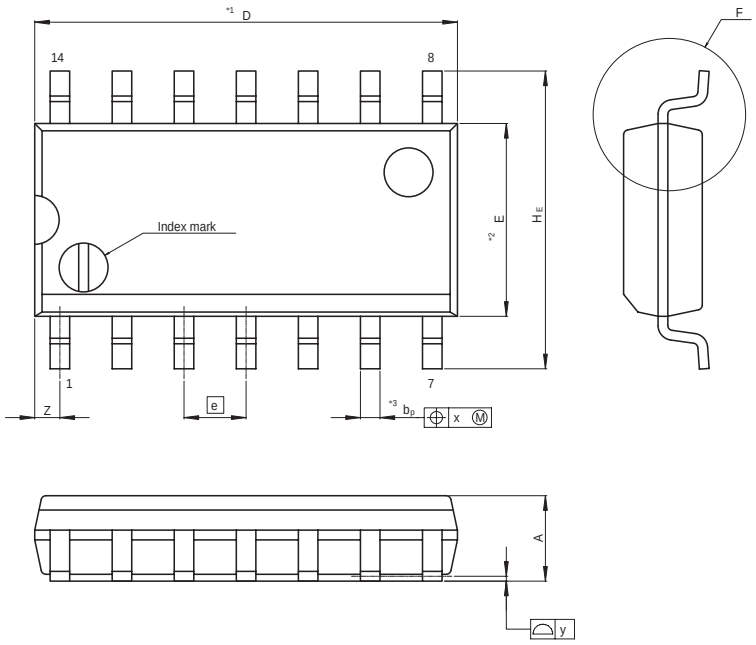
Terminal cross section
(Ni/Pd/Au plating)



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	——	10.06	10.5
E	——	5.50	——
A_2	——	——	——
A_1	0.00	0.10	0.20
A	——	——	2.20
b_p	0.34	0.40	0.46
b_1	——	——	——
c	0.15	0.20	0.25
c_1	——	——	——
θ	0°	——	8°
H_E	7.50	7.80	8.00
e	——	1.27	——
x	——	——	0.12
y	——	——	0.15
Z	——	——	1.42
L	0.50	0.70	0.90
L_1	——	1.15	——

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



NOTE)
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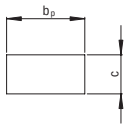
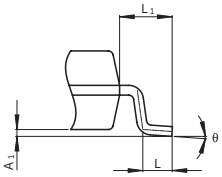
2. DIMENSION"*3"DOES NOT INCLUDE TRIM OFFSET.



Terminal cross section
(Ni/Pd/Au plating)



Detail F

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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