

# RD74HC14A

R07DS0046EJ0100

Rev.1.00

Jul 20, 2010

## Hex Schmitt-trigger Inverters

### Features

- High Speed Operation:  $t_{pd} = 10.5 \text{ ns typ}$  ( $C_L = 50 \text{ pF}$ )
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2 \text{ to } 6 \text{ V}$
- Low Input Current:  $1 \mu\text{A max}$
- Low Quiescent Supply Current:  $I_{CC} \text{ (static)} = 1 \mu\text{A max}$  ( $T_a = 25^\circ\text{C}$ )
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)	Surface Treatment
RD74HC14APT0	DILP-14 pin	PRDP0014AB-B (DP-14AV)	P	—	0 (Ni/Pd/Au)
RD74HC14AFPH0	SOP-14 pin (JEITA)	PRSP0014DF-B (FP-14DAV)	FP	H (2,000 pcs/reel)	0 (Ni/Pd/Au)
RD74HC14ARPH0	SOP-14 pin (JEDEC)	PRSP0014DE-A (FP-14DNV)	RP	H (2,500 pcs/reel)	0 (Ni/Pd/Au)

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

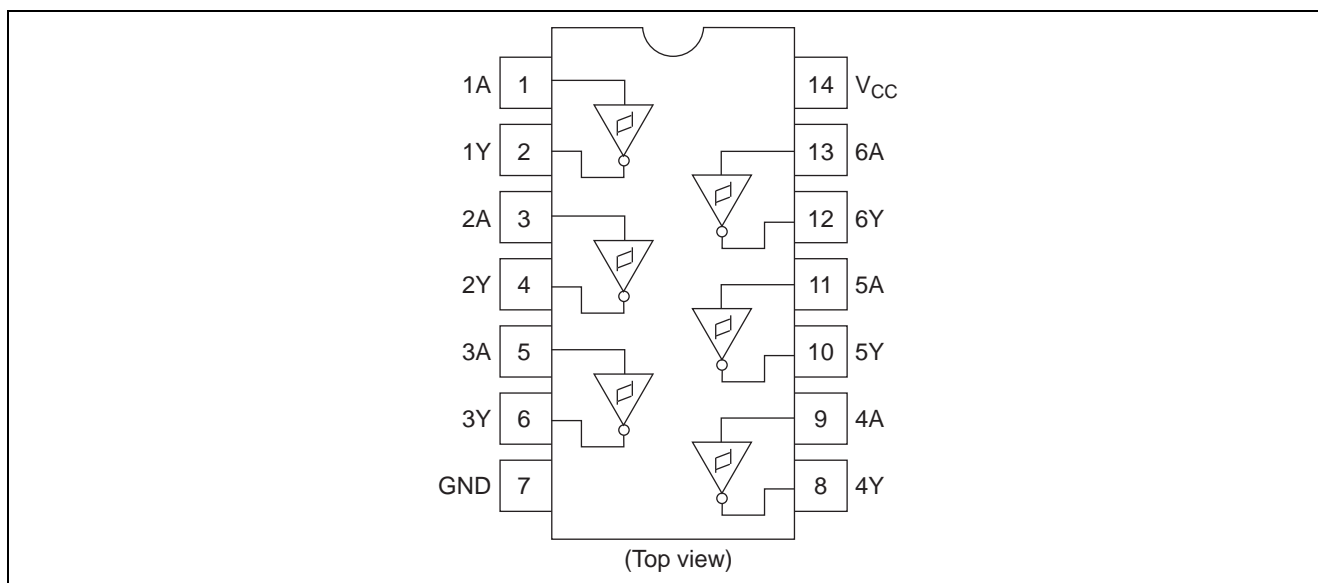
### Function Table

Input	Output
A	Y
L	H
H	L

H : High level

L : Low level

### Pin Arrangement



## Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	$V_{CC}$	-0.5 to 7.0	V	
Input / Output voltage	$V_{in}, V_{out}$	-0.5 to $V_{CC} + 0.5$	V	
Input / Output diode current	$I_{IK}, I_{OK}$	$\pm 20$	mA	
Output current	$I_O$	$\pm 25$	mA	
$V_{CC}$ , GND current	$I_{CC}$ or $I_{GND}$	$\pm 50$	mA	
Power dissipation	$P_T$	1185	mW	DIP
		785	mW	SOP
		500	mW	TSSOP
Storage temperature	$T_{stg}$	-65 to +150	°C	

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

## Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	$V_{CC}$	2 to 6	V	
Input / Output voltage	$V_{IN}, V_{OUT}$	0 to $V_{CC}$	V	
Operating temperature	$T_a$	-40 to 85	°C	
Input rise / fall time <sup>*1</sup>	$t_r, t_f$	0 to unlimited	ns	$V_{CC} = 2.0\text{ V}$
		0 to unlimited		$V_{CC} = 4.5\text{ V}$
		0 to unlimited		$V_{CC} = 6.0\text{ V}$

Note: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

## Electrical Characteristics

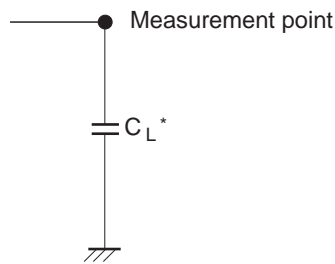
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40\text{ to }+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Threshold voltage	$V_T^+$	2.0	—	—	1.5	—	1.5	V		
		4.5	—	—	3.15	—	3.15			
		6.0	—	—	4.2	—	4.2			
	$V_T^-$	2.0	0.3	—	—	0.3	—	V		
		4.5	0.9	—	—	0.9	—			
		6.0	1.2	—	—	1.2	—			
Hysteresis voltage	$V_H$	2.0	0.2	—	1.2	0.2	1.2	V		
		4.5	0.4	—	2.25	0.4	2.25			
		6.0	0.6	—	3.0	0.6	3.0			
Output voltage	$V_{OH}$	2.0	1.9	2.0	—	1.9	—	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20\text{ }\mu\text{A}$
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	—	—	4.13	—			$I_{OH} = -4\text{ mA}$
		6.0	5.68	—	—	5.63	—			$I_{OH} = -5.2\text{ mA}$
	$V_{OL}$	2.0	—	0.0	0.1	—	0.1	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20\text{ }\mu\text{A}$
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	—	0.26	—	0.33			$I_{OL} = 4\text{ mA}$
		6.0	—	—	0.26	—	0.33			$I_{OL} = 5.2\text{ mA}$
Input current	$I_{in}$	6.0	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu\text{A}$	$V_{in} = V_{CC} \text{ or } GND$	
Quiescent supply current	$I_{CC}$	6.0	—	—	1.0	—	10	$\mu\text{A}$	$V_{in} = V_{CC} \text{ or } GND, I_{out} = 0\text{ }\mu\text{A}$	

## Switching Characteristics

( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = −40 to +85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Propagation delay time	t <sub>PLH</sub>	2.0	—	—	125	—	155	ns	
		4.5	—	10	25	—	31		
		6.0	—	—	21	—	26		
	t <sub>PHL</sub>	2.0	—	—	125	—	155	ns	
		4.5	—	11	25	—	31		
		6.0	—	—	21	—	26		
Output rise time	t <sub>TLH</sub>	2.0	—	—	75	—	95	ns	
		4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Output fall time	t <sub>THL</sub>	2.0	—	—	75	—	95	ns	
		4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	C <sub>in</sub>	—	—	5	10	—	10	pF	

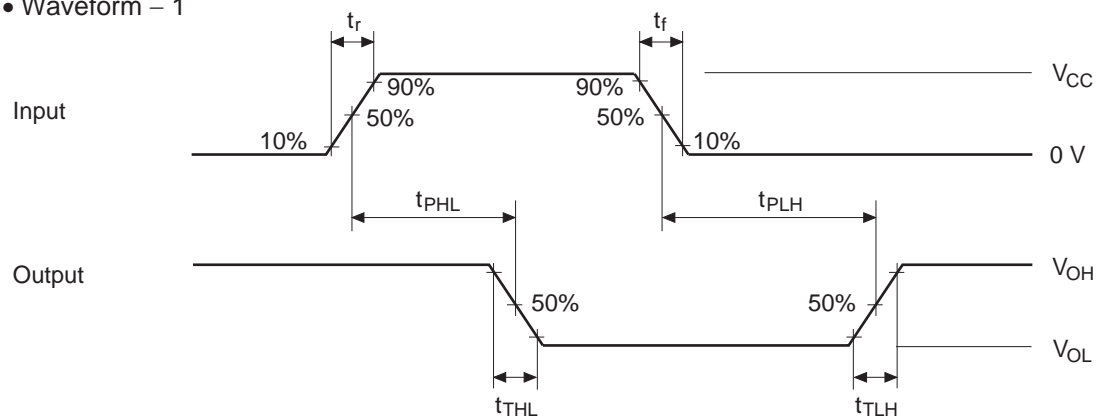
## Test Circuit



Note:  $C_L$  includes the probe and jig capacitance.

## Waveforms

### • Waveform – 1



Notes: 1. Input waveform:  $PRR \leq 1$  MHz,  $Z_o = 50 \Omega$ ,  $t_r \leq 6$  ns,  $t_f \leq 6$  ns  
 2. The output are measured one at a time with one transition per measurement.

## 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 <sub>1</sub>	—	7.62	—
D	—	19.2	20.32
E	—	6.3	7.4
A	—	—	5.06
A <sub>1</sub>	0.51	—	—
b <sub>p</sub>	0.40	0.48	0.56
b <sub>3</sub>	—	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

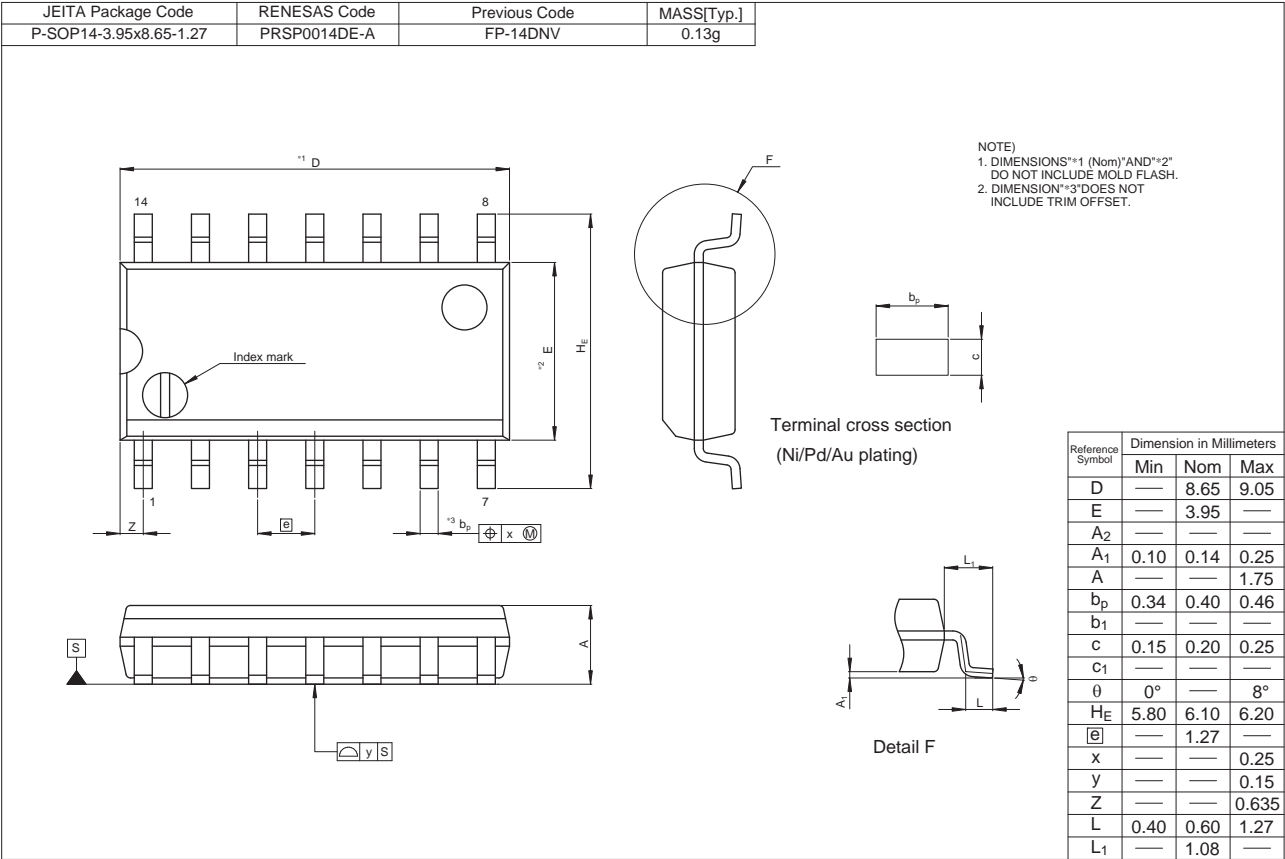
  

Terminal cross section  
(Ni/Pd/Au plating)

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

Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	10.06	10.5
E	—	5.50	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.00	0.10	0.20
A	—	—	2.20
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>	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 <sub>1</sub>	—	1.15	—



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