



# HD74AC14

## Hex Inverter Schmitt Trigger

REJ03D0250-0300

Rev.3.00

Aug 31, 2007

### Description

The HD74AC14 contains six logic inverters which accept standard CMOS input signals and provide standard CMOS output levels. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have a greater noise margin than conventional inverters.

The HD74AC14 has hysteresis between the positive-going and negative-going input thresholds (typically 1.0 V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

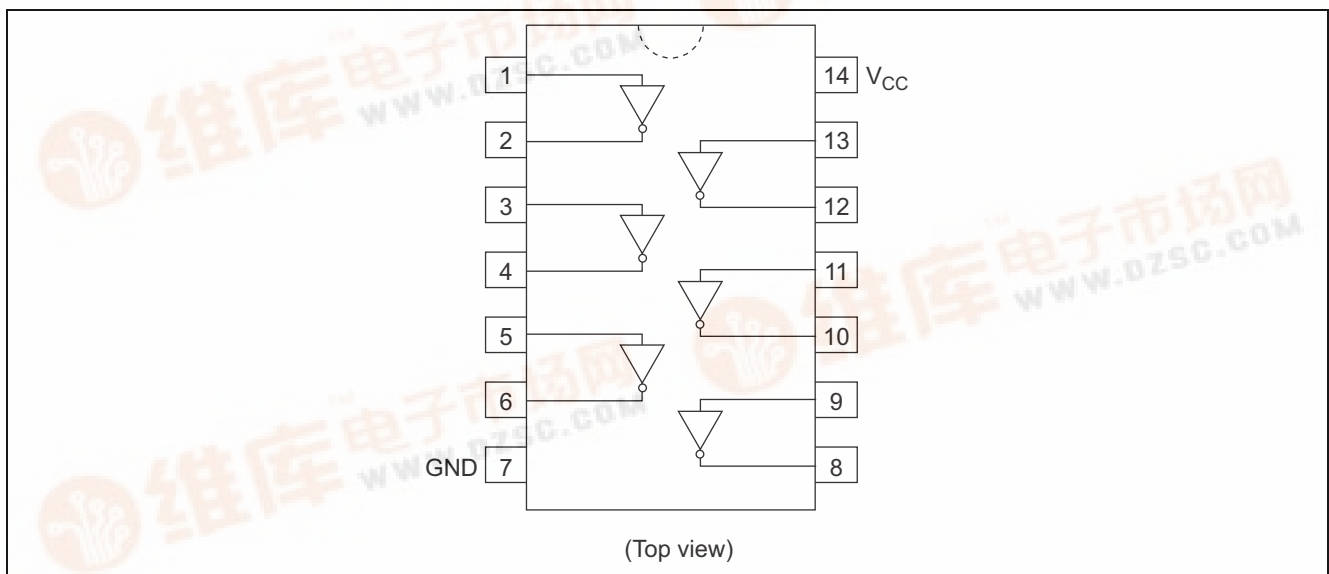
### Features

- Outputs Source/Sink 24 mA
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74AC14P	DILP-14 pin	PRDP0014AB-B (DP-14AV)	P	—
HD74AC14FPEL	SOP-14 pin (JEITA)	PRSP0014DF-B (FP-14DAV)	FP	EL (2,000 pcs/reel)
HD74AC14RPEL	SOP-14 pin (JEDEC)	PRSP0014DE-A (FP-14DNV)	RP	EL (2,500 pcs/reel)
HD74AC14TELL	TSSOP-20 pin	PTSP0014JA-B (TTP-14DV)	T	ELL (2,000 pcs/reel)

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

### Pin Arrangement



## Function Table

Input A	Output O
L	H
H	L

H : High level

L : Low level

## Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Condition
Supply voltage	$V_{CC}$	-0.5 to 7	V	
DC input diode current	$I_{IK}$	-20	mA	$V_I = -0.5V$
		20	mA	$V_I = V_{CC}+0.5V$
DC input voltage	$V_I$	-0.5 to $V_{CC}+0.5$	V	
DC output diode current	$I_{OK}$	-50	mA	$V_O = -0.5V$
		50	mA	$V_O = V_{CC}+0.5V$
DC output voltage	$V_O$	-0.5 to $V_{CC}+0.5$	V	
DC output source or sink current	$I_O$	$\pm 50$	mA	
DC $V_{CC}$ or ground current per output pin	$I_{CC}, I_{GND}$	$\pm 50$	mA	
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.

1. The maximum package power dissipation was calculated using a junction temperature of 150°C

## Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Condition
Supply voltage	$V_{CC}$	2 to 6	V	
Input and output voltage	$V_I, V_O$	0 to $V_{CC}$	V	
Operating temperature	$T_a$	-40 to +85	°C	
Input rise and fall time (except Schmitt inputs) $V_{IN}$ 30% to 70% $V_{CC}$	$t_r, t_f$	8	ns/V	$V_{CC} = 3.0V$
				$V_{CC} = 4.5 V$
				$V_{CC} = 5.5 V$

Note : Unused or floating inputs must be held high or low.

## DC Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Condition
			min.	typ.	max.	min.	max.		
Positive threshold voltage	V <sub>T</sub> <sup>+</sup>	3.0	—	—	2.2	—	2.2	V	
		4.5	—	—	3.2	—	3.2		
		5.5	—	—	3.9	—	3.9		
	V <sub>T</sub> <sup>-</sup>	3.0	0.5	—	—	0.5	—	V	
		4.5	0.9	—	—	0.9	—		
		5.5	1.1	—	—	1.1	—		
Hysteresis voltage	V <sub>H</sub> (max)	3.0	—	—	1.2	—	1.2	V	
		4.5	—	—	1.4	—	1.4		
		5.5	—	—	1.6	—	1.6		
	V <sub>H</sub> (min)	3.0	0.3	—	—	0.3	—	V	
		4.5	0.4	—	—	0.4	—		
		5.5	0.5	—	—	0.5	—		
Output voltage	V <sub>OH</sub>	3.0	2.9	2.99	—	2.9	—	V	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OUT</sub> = -50 μA
		4.5	4.4	4.49	—	4.4	—		
		5.5	5.4	5.49	—	5.4	—		
		3.0	2.58	—	—	2.48	—		
		4.5	3.94	—	—	3.80	—		
		5.5	4.94	—	—	4.80	—		
	V <sub>OL</sub>	3.0	—	0.002	0.1	—	0.1		V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OUT</sub> = 50 μA
		4.5	—	0.001	0.1	—	0.1		
		5.5	—	0.001	0.1	—	0.1		
		3.0	—	—	0.32	—	0.37		
		4.5	—	—	0.32	—	0.37		
		5.5	—	—	0.32	—	0.37		
									V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub>
									I <sub>OH</sub> = -12 mA
									I <sub>OH</sub> = -24 mA
									I <sub>OH</sub> = -24 mA
									I <sub>OL</sub> = 12 mA
									I <sub>OL</sub> = 24 mA
									I <sub>OL</sub> = 24 mA
Input leakage current	I <sub>IN</sub>	5.5	—	—	±0.1	—	±1.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND
Dynamic output current*	I <sub>OLD</sub>	5.5	—	—	—	86	—	mA	V <sub>OLD</sub> = 1.1 V
	I <sub>OHD</sub>	5.5	—	—	—	-75	—	mA	V <sub>OHD</sub> = 3.85 V
Quiescent supply current	I <sub>CC</sub>	5.5	—	—	4.0	—	40.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND

\*Maximum test duration 2.0 ms, one output loaded at a time.

## AC Characteristics

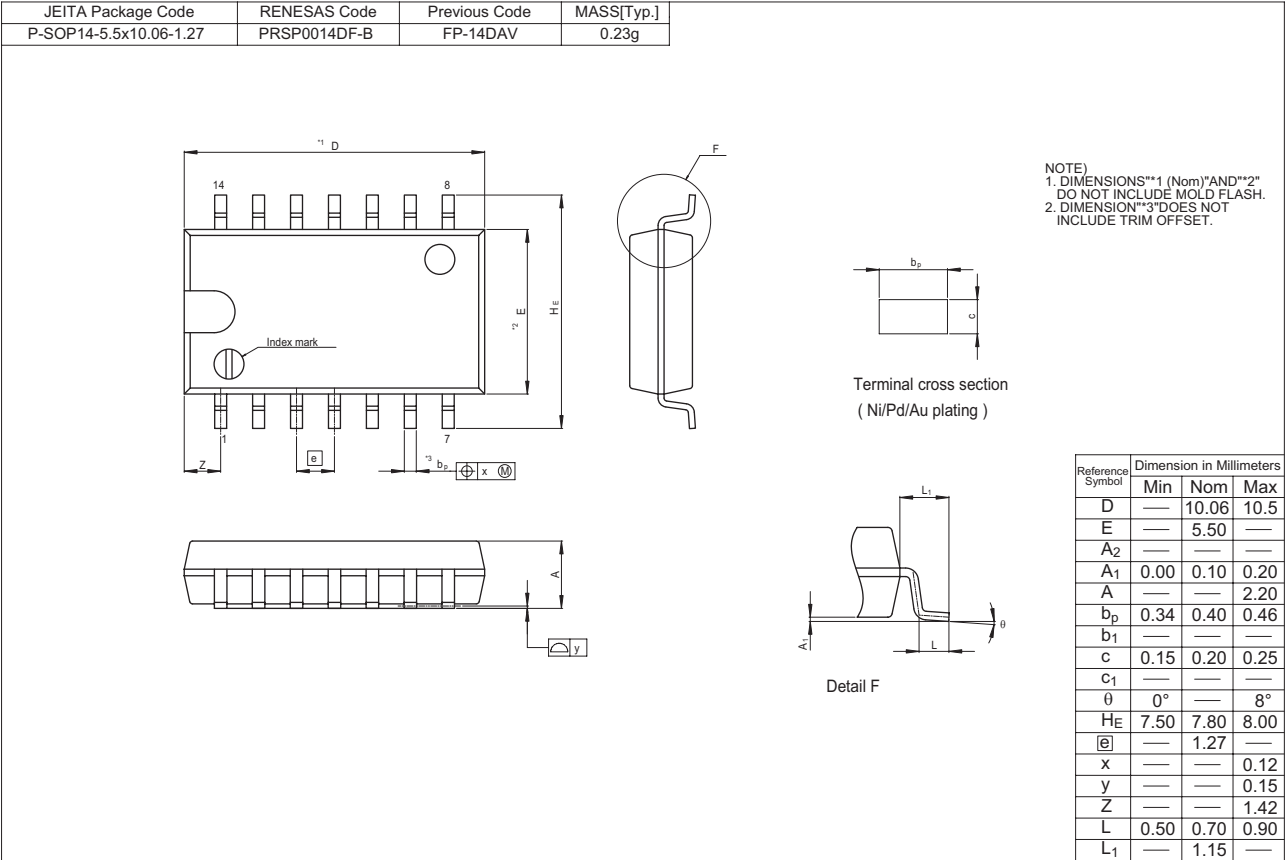
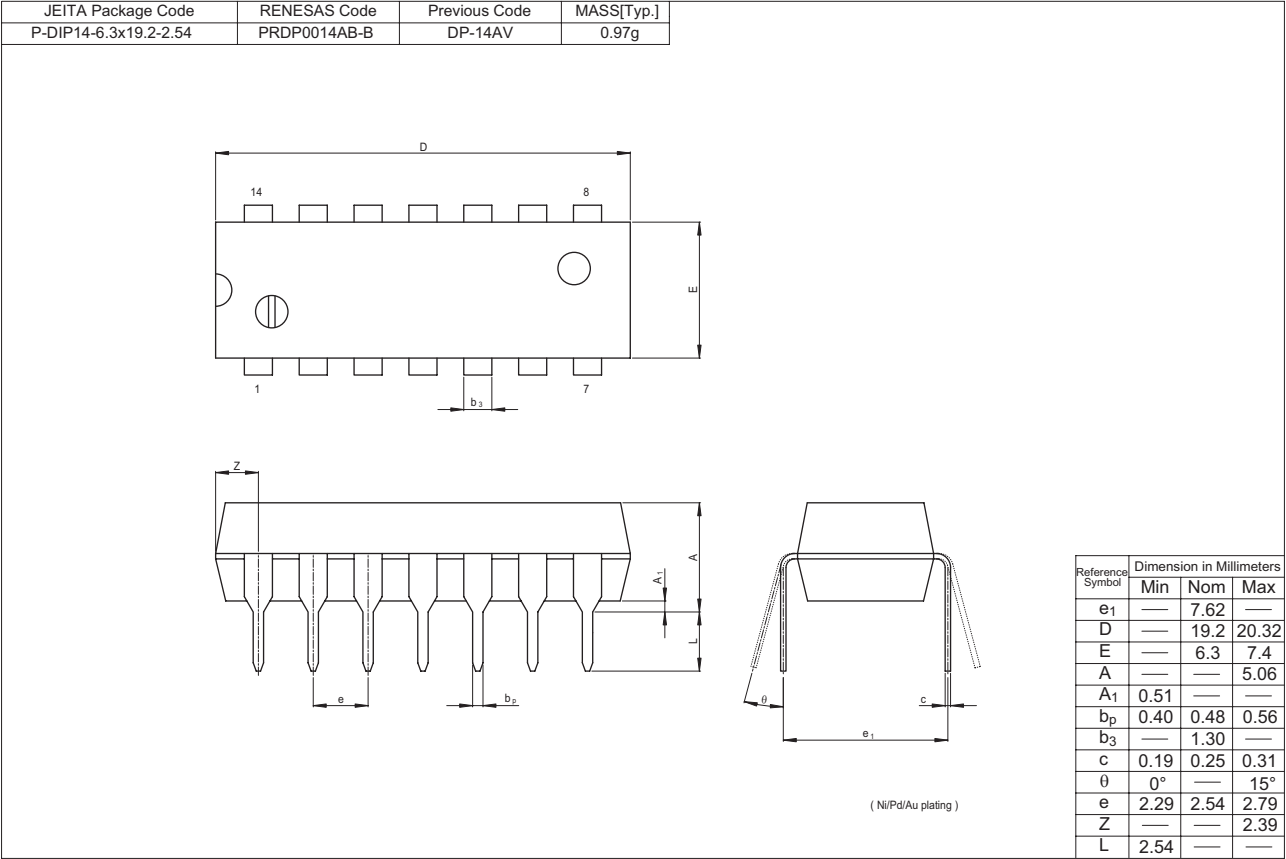
Item	Symbol	$V_{CC}$ (V)* <sup>1</sup>	Ta = +25°C CL = 50 pF			Ta = -40°C to +85°C CL = 50 pF		Unit
			Min	Typ	Max	Min	Max	
Propagation delay	$t_{PLH}$	3.3	1.0	9.5	13.5	1.0	15.0	ns
		5.0	1.0	7.0	10.0	1.0	11.0	
Propagation delay	$t_{PHL}$	3.3	1.0	7.5	11.5	1.0	13.0	ns
		5.0	1.0	6.0	8.5	1.0	9.5	

Note: 1. Voltage Range 3.3 is 3.3 V  $\pm$  0.3 V  
Voltage Range 5.0 is 5.0 V  $\pm$  0.5 V

## Capacitance

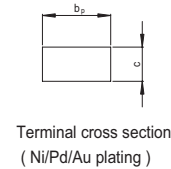
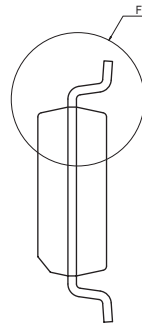
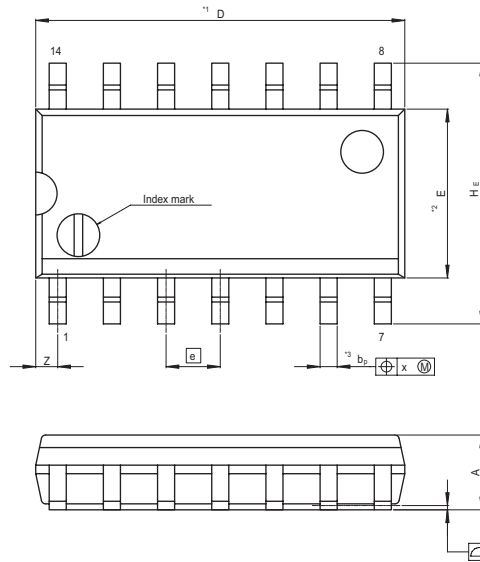
Item	Symbol	Typ	Unit	Condition
Input capacitance	$C_{IN}$	4.5	pF	$V_{CC} = 5.5$ V
Power dissipation capacitance	$C_{PD}$	25.0	pF	$V_{CC} = 5.0$ V

Package Dimensions

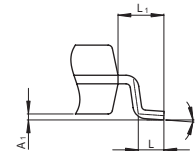


# HD74AC14

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



Terminal cross section  
( Ni/Pd/Au plating )

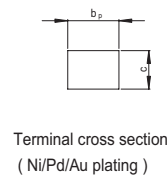
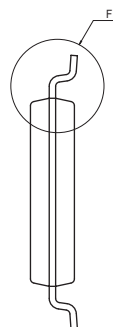
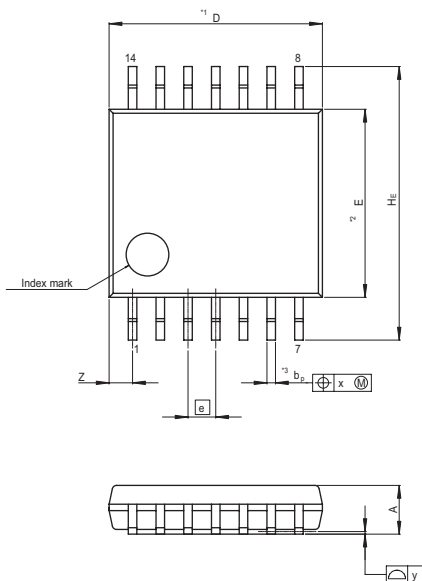


Detail F

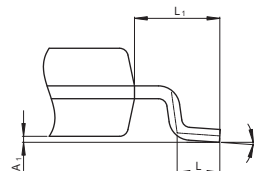
NOTE)  
1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2"  
DO NOT INCLUDE MOLD FLASH.  
2. DIMENSION\*\*3 DOES NOT  
INCLUDE TRIM OFFSET.

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
⌀	—	1.27	—
x	—	—	0.25
y	—	—	0.15
z	—	—	0.635
L	0.40	0.60	1.27
L <sub>1</sub>	—	1.08	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-TSSOP14-4.4x5-0.65	PTSP0014JA-B	TTP-14DV	0.05g



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	—	5.00	5.30
E	—	4.40	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.03	0.07	0.10
A	—	—	1.10
b <sub>p</sub>	0.15	0.20	0.25
b <sub>1</sub>	—	—	—
c	0.10	0.15	0.20
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	6.20	6.40	6.60
⌀	—	0.65	—
x	—	—	0.13
y	—	—	0.10
z	—	—	0.83
L	0.4	0.5	0.6
L <sub>1</sub>	—	1.0	—

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