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April 1st, 2010
Renesas Electronics Corporation

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HD74LVU04A

Hex Inverters

REJ03D0228-0200Z
 (Previous ADE-205-248 (Z))
 Rev.2.00
 May 21, 2004

Description

The HD74LVU04A has six inverters with unbuffered outputs in a 14-pin package.

Low-voltage and high-speed operation is suitable for the battery-powered products (e.g., notebook computers), and the low-power consumption extends the battery life.

Features

- $V_{CC} = 2.0\text{ V to }5.5\text{ V}$ operation
- All inputs V_{IH} (Max.) = 5.5 V (@ $V_{CC} = 0\text{ V to }5.5\text{ V}$)
- All outputs V_O (Max.) = 5.5 V (@ $V_{CC} = 0\text{ V}$)
- Typical V_{OL} ground bounce < 0.8 V (@ $V_{CC} = 3.3\text{ V}$, $T_a = 25^\circ\text{C}$)
- Typical V_{OH} undershoot > 2.3 V (@ $V_{CC} = 3.3\text{ V}$, $T_a = 25^\circ\text{C}$)
- Output current $\pm 6\text{ mA}$ (@ $V_{CC} = 3.0\text{ V to }3.6\text{ V}$), $\pm 12\text{ mA}$ (@ $V_{CC} = 4.5\text{ V to }5.5\text{ V}$)
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LVU04AFPEL	SOP-14 pin(JEITA)	FP-14DAV	FP	EL (2,000 pcs/reel)
HD74LVU04ARPEL	SOP-14 pin(JEDEC)	FP-14DNV	RP	EL (2,500 pcs/reel)
HD74LVU04ATELL	TSSOP-14 pin	TTP-14DV	T	ELL (2,000 pcs/reel)

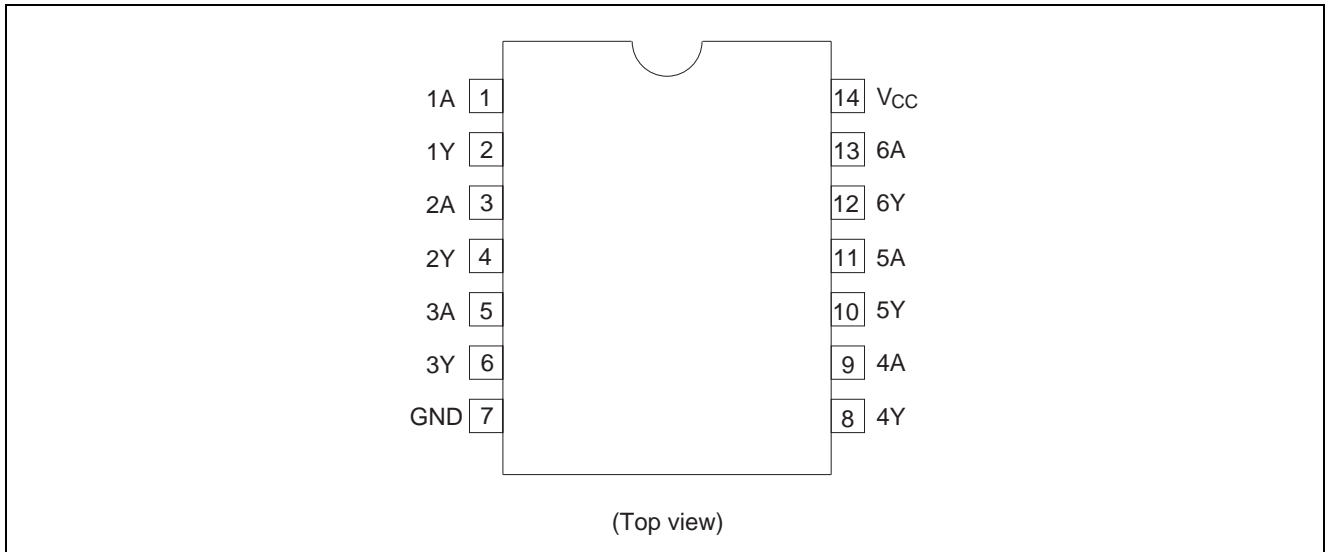
Note: Please consult the sales office for the above package availability.

Function Table

Input A	Output Y
H	L
L	H

Note: 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 voltage range ^{*1}	V_I	-0.5 to 7.0	V	
Output voltage range ^{*1, 2}	V_O	-0.5 to $V_{CC} + 0.5$	V	Output: H or L
Input clamp current	I_{IK}	-20	mA	$V_I < 0$
Output clamp current	I_{OK}	± 50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	± 25	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	± 50	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) ^{*3}	P_T	785 500	mW	SOP TSSOP
Storage temperature	T_{stg}	-65 to 150	$^\circ\text{C}$	

Notes: 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.

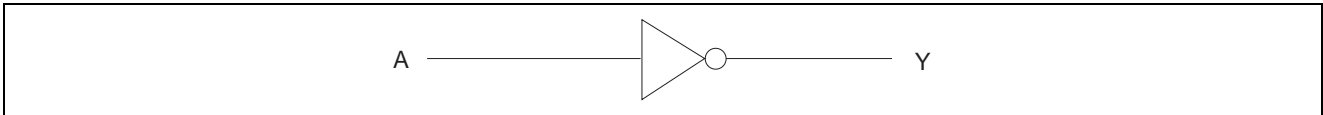
1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 5.5 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	2.0	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	V_O	0	V_{CC}	V	
Output current	I_{OH}	—	-50	μA	$V_{CC} = 2.0 V$
		—	-2	mA	$V_{CC} = 2.3 \text{ to } 2.7 V$
		—	-6		$V_{CC} = 3.0 \text{ to } 3.6 V$
		—	-12		$V_{CC} = 4.5 \text{ to } 5.5 V$
	I_{OL}	—	50	μA	$V_{CC} = 2.0 V$
		—	2	mA	$V_{CC} = 2.3 \text{ to } 2.7 V$
		—	6		$V_{CC} = 3.0 \text{ to } 3.6 V$
		—	12		$V_{CC} = 4.5 \text{ to } 5.5 V$
Operating free-air temperature	T_a	-40	85	$^{\circ}C$	

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

Logic Diagram



DC Electrical Characteristics

Ta = -40 to 85°C

Item	Symbol	V _{CC} (V)*	Min	Typ	Max	Unit	Test Conditions		
Input voltage	V _{IH}	2.0	1.7	—	—	V			
		2.3 to 2.7	V _{CC} × 0.8	—	—				
		3.0 to 3.6	V _{CC} × 0.8	—	—				
		4.5 to 5.5	V _{CC} × 0.8	—	—				
	V _{IL}	2.0	—	—	0.3				
		2.3 to 2.7	—	—	V _{CC} × 0.2				
		3.0 to 3.6	—	—	V _{CC} × 0.2				
		4.5 to 5.5	—	—	V _{CC} × 0.2				
Output voltage	V _{OH}	Min to Max	V _{CC} - 0.1	—	—	V	I _{OL} = -50 μA		
		2.3	2.0	—	—		I _{OL} = -2 mA		
		3.0	2.48	—	—		I _{OL} = -6 mA		
		4.5	3.8	—	—		I _{OL} = -12 mA		
	V _{OL}	Min to Max	—	—	0.1		I _{OL} = 50 μA		
		2.3	—	—	0.4		I _{OL} = 2 mA		
		3.0	—	—	0.44		I _{OL} = 6 mA		
		4.5	—	—	0.55		I _{OL} = 12 mA		
	Input current	I _{IN}	0 to 5.5	—	—		±1	μA	V _{IN} = 5.5 V or GND
	Quiescent supply current	I _{CC}	5.5	—	—		20	μA	V _{IN} = V _{CC} or GND, I _O = 0
Input capacitance	C _{IN}	3.3	—	4.0	—	pF	V _I = V _{CC} or GND		

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

Switching Characteristics

V_{CC} = 2.5 ± 0.2 V

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t _{PLH}	—	3.2	10.9	1.0	14.0	ns	C _L = 15 pF	A	Y
	t _{PHL}	—	6.6	13.4	1.0	16.0				

V_{CC} = 3.3 ± 0.3 V

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t _{PLH}	—	2.5	8.9	1.0	10.5	ns	C _L = 15 pF	A	Y
	t _{PHL}	—	4.7	11.4	1.0	13.0				

V_{CC} = 5.0 ± 0.5 V

Item	Symbol	Ta = 25°C			Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t _{PLH}	—	2.2	5.5	1.0	6.5	ns	C _L = 15 pF	A	Y
	t _{PHL}	—	3.9	7.0	1.0	8.0				

Operating Characteristics

$C_L = 50 \text{ pF}$

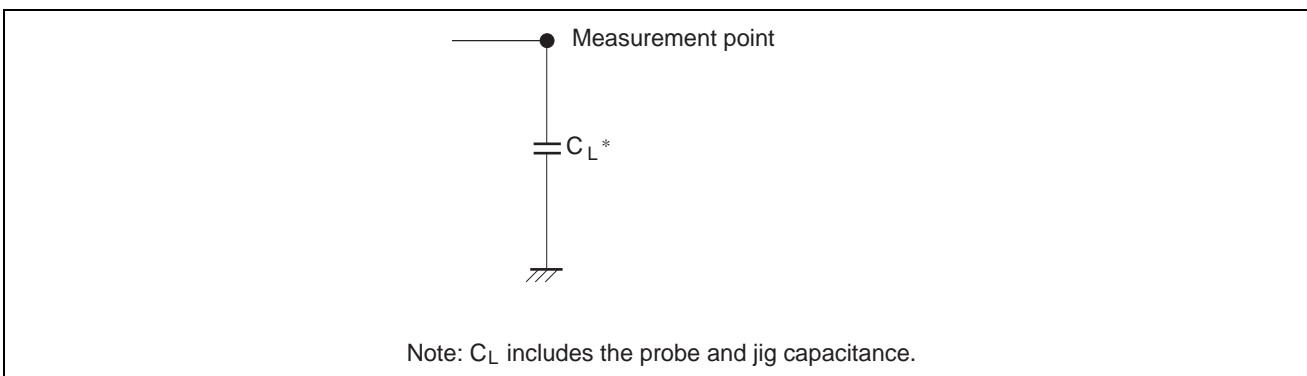
Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	3.3	—	5.6	—	pF	f = 10 MHz
		5.0	—	6.7	—		

Noise Characteristics

$C_L = 50 \text{ pF}$

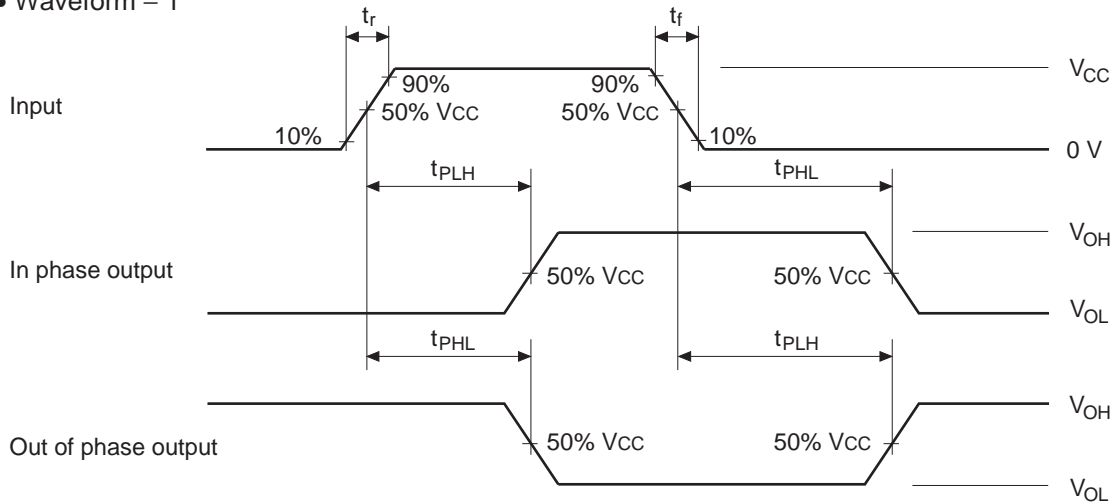
Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			Unit	Test Conditions
			Min	Typ	Max		
Quiet output, maximum dynamic V_{OL}	$V_{OL(P)}$	3.3	—	0.5	0.8	V	
Quiet output, minimum dynamic V_{OL}	$V_{OL(V)}$	3.3	—	-0.1	-0.8	V	
Quiet output, minimum dynamic V_{OH}	$V_{OH(V)}$	3.3	—	3.0	—	V	
High-level dynamic put voltage	$V_{IH(D)}$	3.3	2.31	—	—	V	
Low-level dynamic put voltage	$V_{IL(D)}$	3.3	—	—	0.99	V	

Test Circuit



HD74LVU04A

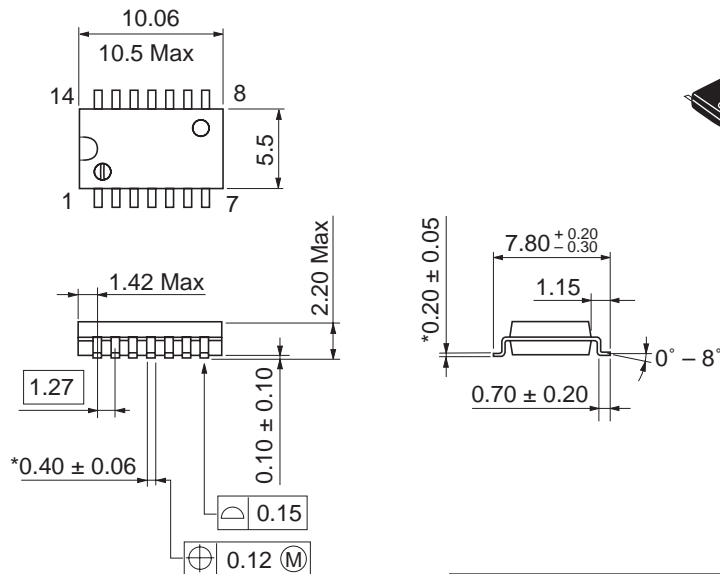
• Waveform – 1



- Notes: 1. Input waveform: PRR ≤ 1 MHz, Zo = 50 Ω, tr ≤ 3 ns, tf ≤ 3 ns
 2. The output are measured one at a time with one transition per measurement.

Package Dimensions

As of January, 2003
 Unit: mm

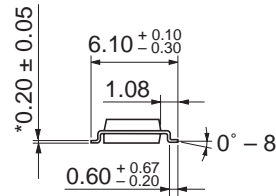
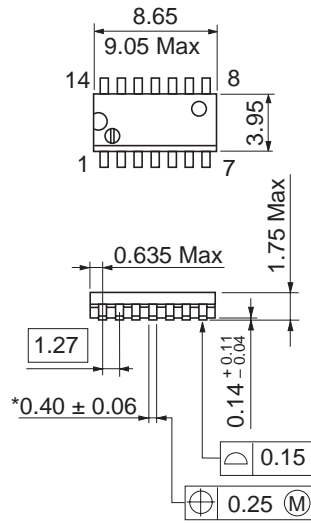


*Ni/Pd/Au plating

Package Code	FP-14DAV
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.23 g

As of January, 2003

Unit: mm

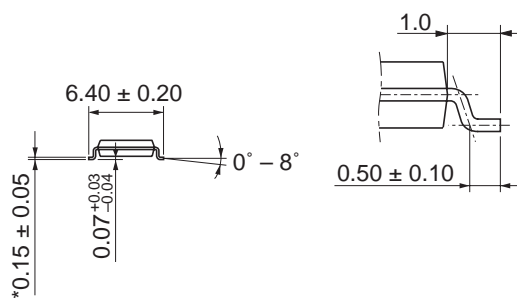
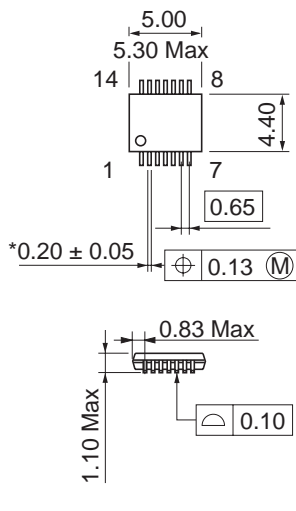


Package Code	FP-14DNV
JEDEC	Conforms
JEITA	Conforms
Mass (reference value)	0.13 g

*Ni/Pd/Au plating

As of January, 2003

Unit: mm



Package Code	TTP-14DV
JEDEC	—
JEITA	—
Mass (reference value)	0.05 g

*Ni/Pd/Au plating

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