

HD74LV21A

Dual 4-input Positive AND Gates

REJ03D0237-0300Z (Previous ADE-205-255A (Z)) Rev.3.00 Jun. 01, 2004

Description

The HD74LV21A performs the Boolean functions $Y = A \cdot B \cdot C \cdot D$ or $Y = \overline{A} + \overline{B} + \overline{C} + \overline{D}$ in positive logic. 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 V to 5.5 V)
- All outputs V_O (Max.) = 5.5 V (@ V_{CC} = 0 V)
- Typical V_{OL} ground bounce < 0.8 V (@ V_{CC} = 3.3 V, Ta = 25°C)
- Typical V_{OH} undershoot > 2.3 V (@ V_{CC} = 3.3 V, Ta = 25°C)
- Output current ± 6 mA (@V_{CC} = 3.0 V to 3.6 V), ± 12 mA (@V_{CC} = 4.5 V to 5.5 V)
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV21AFPEL	SOP-14 pin(JEITA)	FP-14DAV	FP	EL (2,000 pcs/reel)
HD74LV21ARPEL	SOP-14 pin(JEDEC)	FP-14DNV	RP	EL (2,500 pcs/reel)
HD74LV21ATELL	TSSOP-14 pin	TTP-14DV	Т	ELL (2,000 pcs/reel)

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

Function Table

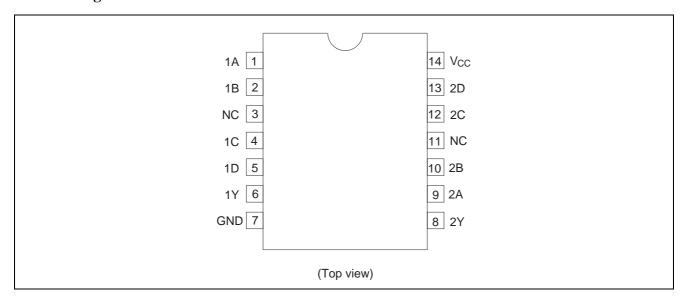
Inputs

Α	В	С	D	Output Y	
Н	Н	Н	Н	Н	
L	Χ	Χ	Χ	L	
Χ	L	Χ	Χ	L	
X	Χ	L	Χ	L	
X	Χ	X	L	L	

Note: H: High level L: Low level

X: Immaterial

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	Vı	-0.5 to 7.0	V	
Output voltage range*1, 2	Vo	-0.5 to V _{CC} + 0.5	V	Output: H or L
		-0.5 to 7.0		V _{CC} : OFF
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	lo	±25	mA	$V_O = 0$ to V_{CC}
Continuous current through	I _{CC} or I _{GND}	±50	mA	
V _{CC} or GND				
Maximum power dissipation at	P _T	785	mW	SOP
Ta = 25° C (in still air)* ³		500		TSSOP
Storage temperature	Tstg	-65 to 150	°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.

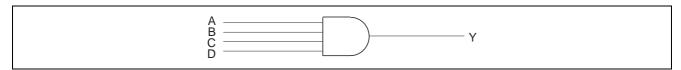
- 1. The input and output voltage ratings may be exceeded even if the input and output clamp-current ratings are observed.
- 2. This value is limited to 5.5 V maximum.
- 3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	Vcc	2.0	5.5	V	
Input voltage range	Vı	0	5.5	V	
Output voltage range	Vo	0	V _{CC}	V	
Output current	I _{OH}	_	- 50	μΑ	V _{CC} = 2.0 V
		_	-2	mA	V _{CC} = 2.3 to 2.7 V
		_	-6		V _{CC} = 3.0 to 3.6 V
		_	-12		V _{CC} = 4.5 to 5.5 V
	I _{OL}	_	50	μΑ	V _{CC} = 2.0 V
		_	2	mA	V _{CC} = 2.3 to 2.7 V
		_	6		V _{CC} = 3.0 to 3.6 V
		_	12		V _{CC} = 4.5 to 5.5 V
Input transition rise or fall rate	Δt /Δν	0	200	ns/V	V _{CC} = 2.3 to 2.7 V
		0	100		V _{CC} = 3.0 to 3.6 V
		0	20		V _{CC} = 4.5 to 5.5 V
Operating free-air temperature	Та	-40	85	°C	

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

Logic Diagram



DC Electrical Characteristics

 $Ta = -40 \text{ to } 85^{\circ}\text{C}$

Item	Symbol	V _{CC} (V)*	Min	Тур	Max	Unit	Test Conditions
Input voltage	V _{IH}	2.0	1.5	_	_	V	
		2.3 to 2.7	$V_{CC} \times 0.7$	_	_		
		3.0 to 3.6	$V_{CC} \times 0.7$	_	_		
		4.5 to 5.5	$V_{CC} \times 0.7$	_	_		
	V _{IL}	2.0	_	_	0.5		
		2.3 to 2.7	_	_	$V_{CC} \times 0.3$		
		3.0 to 3.6	_	_	$V_{CC} \times 0.3$		
		4.5 to 5.5	_	_	$V_{CC} \times 0.3$		
Output voltage	V _{OH}	Min to Max	V _{CC} - 0.1	_	_	V	I _{OH} = -50 μA
		2.3	2.0	_	_		$I_{OH} = -2 \text{ mA}$
		3.0	2.48	_	_		$I_{OH} = -6 \text{ mA}$
		4.5	3.8	_	_		I _{OH} = -12 mA
	V _{OL}	Min to Max	_	_	0.1		$I_{OL} = 50 \mu\text{A}$
		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	μΑ	V _{IN} = 5.5 V or GND
Quiescent supply	I _{CC}	5.5	_	_	20	μΑ	$V_{IN} = V_{CC}$ or GND, $I_O = 0$
current							
Output leakage	I_{OFF}	0	_	_	5	μΑ	V_1 or $V_0 = 0$ V to 5.5 V
current							
Input capacitance	C _{IN}	3.3	_	3.5	_	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

 $V_{CC}=2.5\pm0.2\ V$

		Ta =	25°C		Ta = -	40 to 85°C		Test	FROM	ТО
Item	Symbol	Min	Тур	Max	Min	Max	Unit	Conditions	(Input)	(Output)
Propagation	t _{PLH}	_	7.9	12.0	1.0	14.0	ns	$C_L = 15 pF$	A, B, C,	Υ
delay time	t_{PHL}	_	10.3	15.7	1.0	19.0		C _L = 50 pF	or D	

 $V_{CC} = 3.3 \pm 0.3 \ V$

		Ta =	25°C		Ta = -4	10 to 85°C		Test	FROM	ТО
Item	Symbol	Min	Тур	Max	Min	Max	Unit	Conditions	(Input)	(Output)
Propagation	t _{PLH}	_	4.8	7.0	1.0	8.5	ns	C _L = 15 pF	A, B, C,	Υ
delay time	t_{PHL}	_	7.3	10.5	1.0	12.0		C _L = 50 pF	or D	

 $V_{CC}=5.0\pm0.5\ V$

		Ta = :	25°C		Ta = -4	40 to 85°C		Test	FROM	то
Item	Symbol	Min	Тур	Max	Min	Max	Unit	Conditions	(Input)	(Output)
Propagation	t _{PLH}	_	3.3	5.0	1.0	6.0	ns	$C_L = 15 pF$	A, B, C,	Υ
delay time	t _{PHL}	_	4.8	7.0	1.0	8.0		$C_L = 50 pF$	or D	

Operating Characteristics

 $C_L = 50 \text{ pF}$

Ta =	25°C
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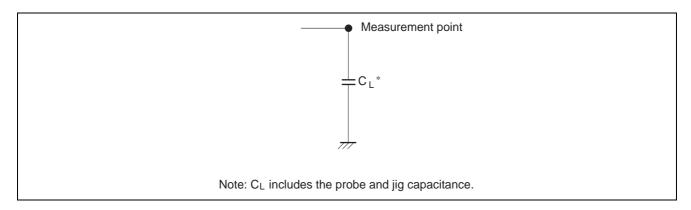
Item	Symbol	V _{CC} (V)	Min	Тур	Max	Unit	Test Conditions
Power dissipation capacitance	C_{PD}	3.3	_	9.5	_	pF	f = 10 MHz
		5.0	_	11.0	_		

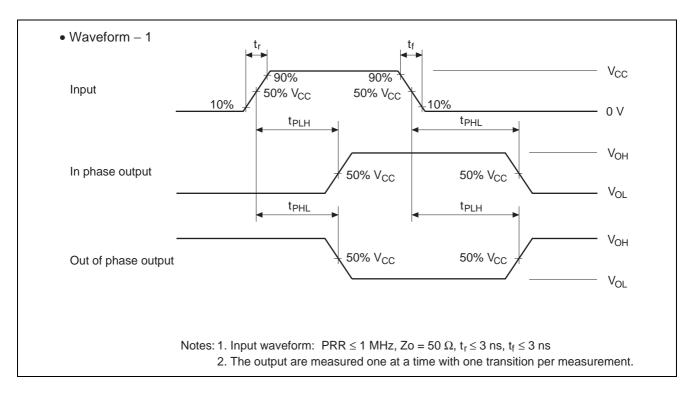
Noise Characteristics

 $C_L = 50 \text{ pF}$

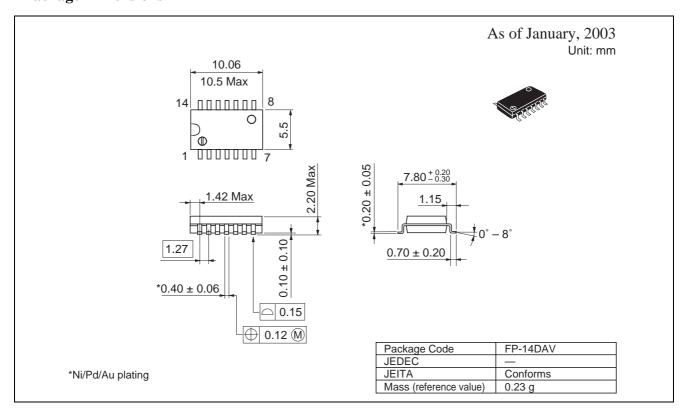
			Ta = 2	5°C			٦	
Item	Symbol	V _{CC} (V)	Min	Тур	Max	Unit	Test Conditions	
Quiet output, maximum dynamic V _{OL}	V _{OL (P)}	3.3	_	0.2	0.8	V		
Quiet output, minimum dynamic V _{OL}	V _{OL (V)}	3.3	_	-0.1	-0.8	V		
Quiet output, minimum dynamic V _{OH}	V _{OH (V)}	3.3	_	3.2	_	V		
High-level dynamic input voltage	V _{IH (D)}	3.3	2.31	_	_	V		
Low-level dynamic inout voltage	V _{IL (D)}	3.3	_	_	0.99	V		

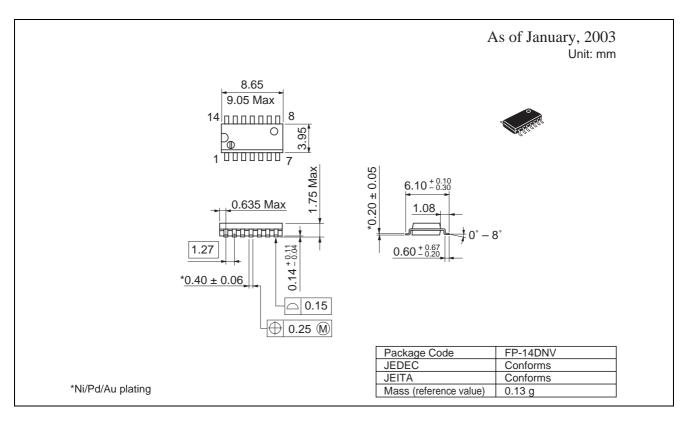
Test Circuit

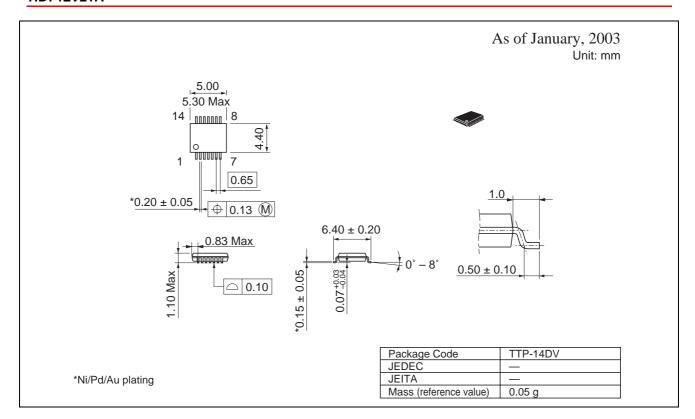




Package Dimensions







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