Quadruple 2-Input NAND Gates

General Description

The ET74LVC00A contains four independent 2-input NAND gates operating from a 1.65V to 5.5V supply.

Features

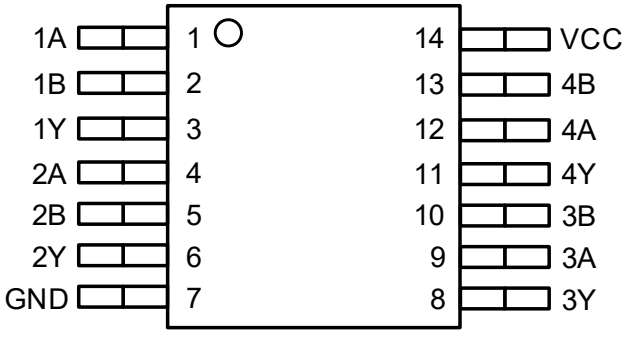
- Designed for 1.65V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- ±24mA Balanced Output Sink and Source Capability
- Near-zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and RoHS Compliant
- ESD Protection Complies with JESD22 Standard
  -- HBM: ±2000V Pass (JEDEC JS-001)
  -- CDM: ±1500V Pass (JEDEC JS-002)
- Latch-up Performance Exceeds ±200mA per JEDEC JESD78F
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ET74LVC00AM14	SOP14 (8.65 mm × 6 mm)	Tape and Reel, 4K/Reel	3
ET74LVC00AV	TSSOP14 (4.96 mm × 6.4 mm)	Tape and Reel, 4K/Reel	3

Applications

- Mobile Device

Pin Configuration



SOP14/TSSOP14

Figure1. Pin Configuration

Pin Function

Pin		I/O	Description
Name	No.		
1A	1	Input	Channel 1, Input A
1B	2	Input	Channel 1, Input B
1Y	3	Output	Channel 1, Output Y
2A	4	Input	Channel 2, Input A
2B	5	Input	Channel 2, Input B
2Y	6	Output	Channel 2, Output Y
GND	7	—	Ground
3Y	8	Output	Channel 3, Output Y
3A	9	Input	Channel 3, Input A
3B	10	Input	Channel 3, Input B
4Y	11	Output	Channel 4, Output Y
4A	12	Input	Channel 4, Input A
4B	13	Input	Channel 4, Input B
VCC	14	—	Positive Supply

Block Diagram

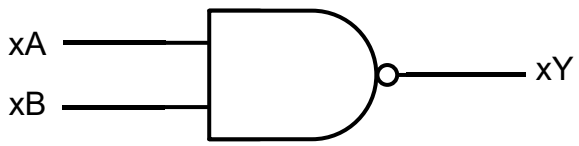


Figure2. Logic Symbol

Functional Table

Input		Output
xA	xB	xY
L	L	H
L	H	H
H	L	H
H	H	L

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage (VCC Pin)		-0.5 to 6.5	V
V_I	DC Input Voltage (1)		-0.5 ≤ V_I ≤ 6.5	V
I_{IK}	DC Input Diode Current, V_I < GND		-50	mA
I_{OK}	DC Output Diode Current, V_O < GND, V_O > V_{CC}		-50	mA
I_O	DC Output Sink Current		±50	mA
I_{CC}	DC Supply Current Per Supply Pin		100	mA
I_{GND}	DC Supply Current Per GND Pin		-100	mA
T_{STG}	Storage Temperature Range		-65 to 150	°C
V_{ESD}	ESD Classification	Human Body Model (2)	±2000	V
		Charged Device Model (3)	±1500	
I_{LU}	Max Latch Up Current Above V_{CC} and GND at 125°C (4)		±200	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note1: I_O absolute maximum rating must be observed.

Note2: HBM tested per JEDEC JS-001;

Note3: CDM tested per JEDEC JS-002;

Note4: Latch Up Current Maximum Rating tested per JEDEC JESD78F.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage Operating	1.65	5.5	V
V_I	DC Input Voltage	0	V_{CC}	V
V_O	DC Output Voltage (High or Low State)	0	V_{CC}	V
T_A	Operating Temperature Range	-40	125	°C

Electrical Characteristics

DC Electrical Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

Symbol	Parameter	Condition		V_{CC} (V)	T_A = 25°C		-40°C ≤ T_A ≤ 125°C		Unit
					Min	Max	Min	Max	
V_{OH}	High-level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OH} = -100μA	1.65~5.5	V_{CC} - 0.2		V_{CC} - 0.2		V
			I_{OH} = -4mA	1.65	1.29		1.05		
			I_{OH} = -8mA	2.3	1.9		1.55		
			I_{OH} = -12mA	2.7	2.2		2.05		
				3	2.4		2.25		
			I_{OH} = -24mA	3	2.3		2		
				5.5	4.8		4.5		
V_{OL}	Low-level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OL} = 100μA	1.65~5.5		0.1		0.3	V
			I_{OL} = 4mA	1.65		0.24		0.6	
			I_{OL} = 8mA	2.3		0.3		0.85	
			I_{OL} = 12mA	2.7		0.4		0.6	
			I_{OL} = 24mA	3		0.55		0.8	
				5.5		0.55		0.8	
I_I	Input Leakage Current	V_I = V_{CC} or 0		5.5		±1		±20	μA
I_{CC}	Supply Current	V_I = V_{CC} or 0	I_O = 0mA	5.5		1		40	μA
ΔI_{CC}		One Input at V_{CC} - 0.6V, Other Inputs at V_{CC} or GND		1.65~5.5		500		5000	μA
C_I	Input Capacitance	V_I = V_{CC} or 0		5.5		5			pF

Electrical Characteristics(Continued)

Switching Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

Symbol	Parameter	From	To	V_{CC} (V)	T_A = 25°C			-40°C ≤ T_A ≤ 125°C		Unit
					Min	Typ	Max	Min	Max	
t_{PD}	Propagation Delay	A or B	Y	1.8 ± 0.15	1	11.5	15	1	19.5	ns
				2.5 ± 0.2	1	5.5	7	1	10	
				2.7	1	6	7.5	1	10.5	
				3.3 ± 0.3	1	5	6.5	1	10	
				5.5		3.5	4.5		8	
$T_{sk(o)}$				3.3 ± 0.3					1	ns

Operating Characteristics

Over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted)

Symbol	Parameter	Condition	V_{CC}(V)	Typ	Unit
C_{PD}	Power Dissipation Capacitance [(5)]	No Load	1.8	18	pF
			2.5	18	pF
			3.3	19	pF
			5.5	19	pF

Note5: C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz;

f_o = output frequency in MHz;

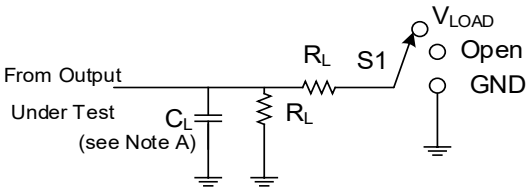
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

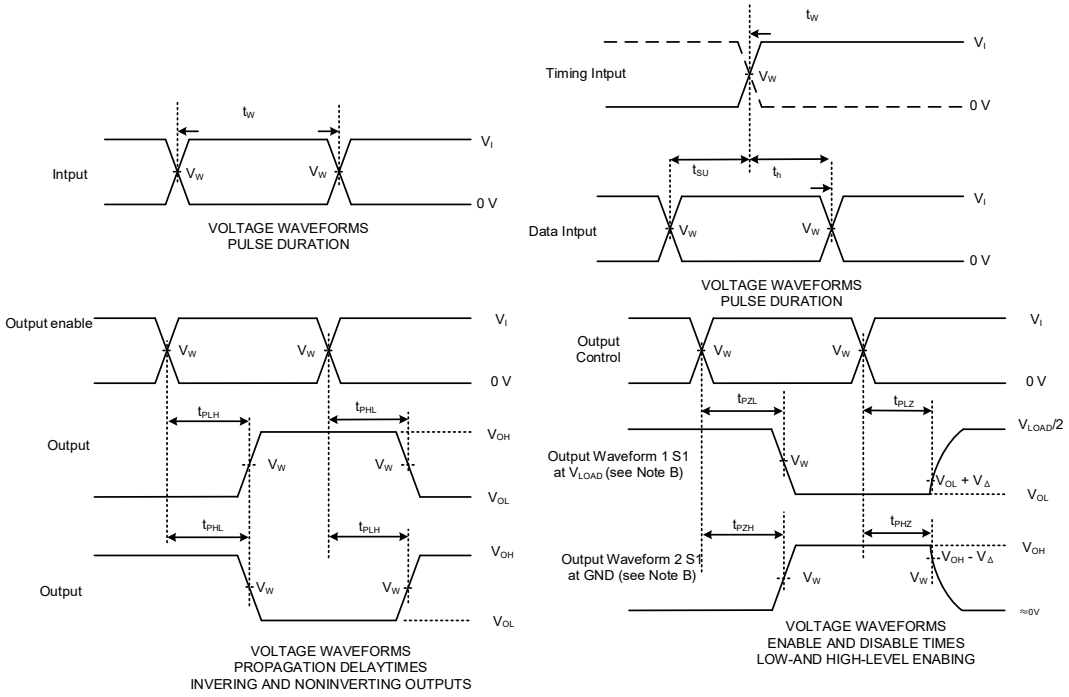
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

Parameter measurement information



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

Figure3. Test Circuit for Measuring Switching Times



Notes:

A. C_L includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.

C. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.

D. All input pulses are supplied by generators having the following characteristics:

PRR ≤10MHz, Z_O = 50Ω

E. The outputs are measured one at a time, with one transition per measurement.

F. t_{PLZ} and t_{PHZ} are the same as t_{dis}.

G. t_{PZL} and t_{PZH} are the same as t_{en}.

H. t_{PLH} and t_{PHL} are the same as t_{pd}.

I. All parameters and waveforms are not applicable to all devices.

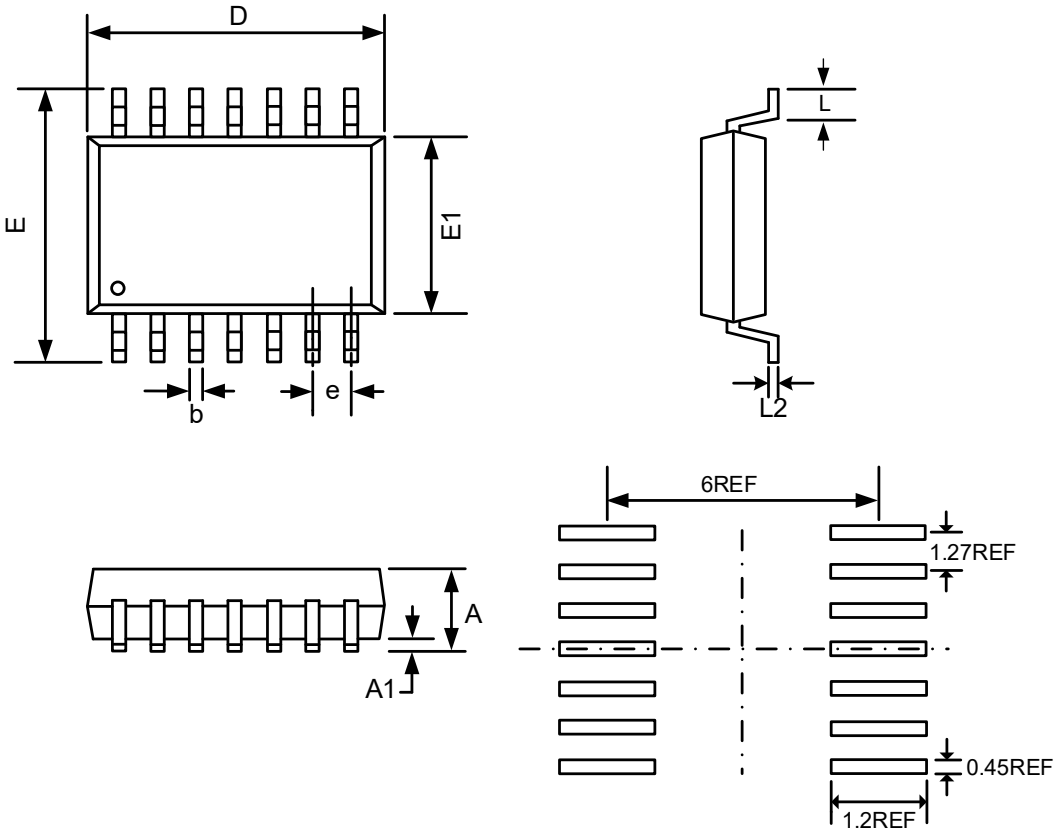
Figure4. Input to Output Propagation Delay Times

Table1. Measurement Points and Test Data

V_{CC}	Input		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	t_r/t_f					
1.8V ± 0.15V	V_{CC}	≤ 2ns	$V_{CC}/2$	2 × V_{CC}	30pF	1kΩ	0.15V
2.5V ± 0.2V	V_{CC}	≤ 2ns	$V_{CC}/2$	2 × V_{CC}	30pF	500Ω	0.15V
2.7V	2.7V	≤ 2.5ns	1.5V	6V	50pF	500Ω	0.3V
3.3V ± 0.3V	2.7V	≤ 2.5ns	1.5V	6V	50pF	500Ω	0.3V
5.5V	V_{CC}	≤ 2.5ns	$V_{CC}/2$	2 × V_{CC}	50pF	500Ω	0.3V

Package Dimension

SOP14 (3.9mm × 8.65mm)

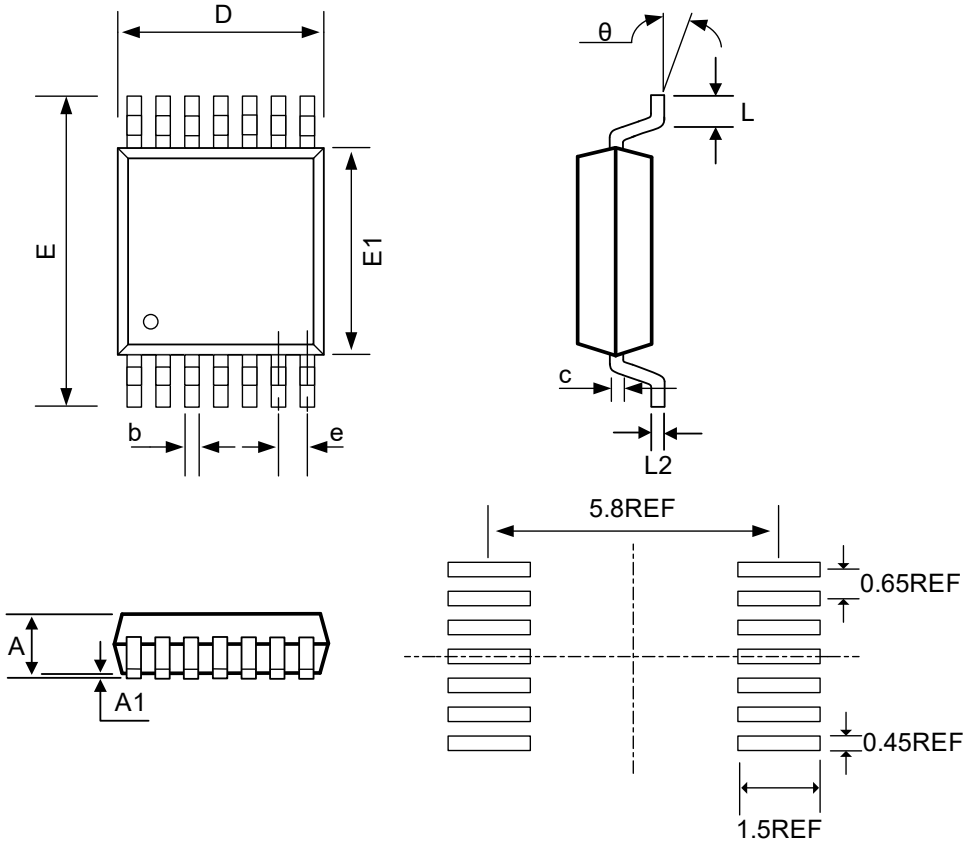


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	MAX
A	--	1.75
A1	0.10	0.25
b	0.36	0.51
D	8.55	8.75
E	5.80	6.20
E1	3.80	4.00
e	1.22	1.32
L	0.45	0.75
L2	0.25 BSC	

TSSOP14 (4.4mm × 5.0mm)



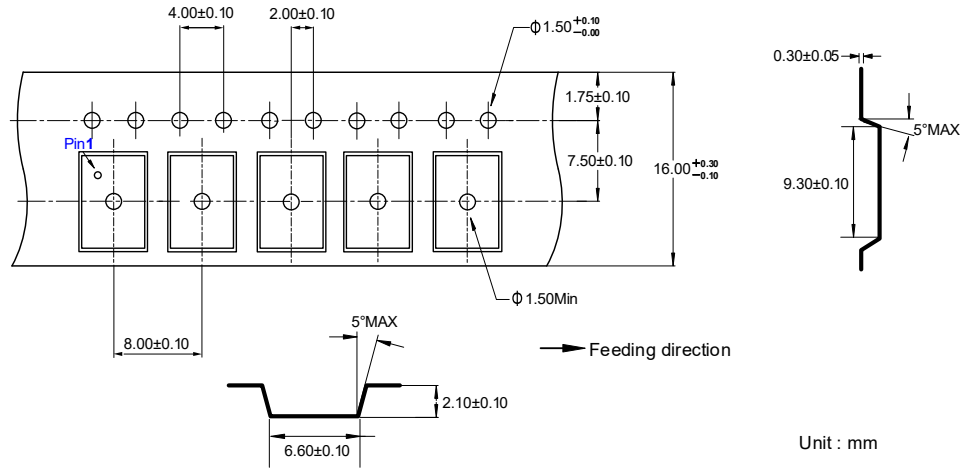
COMMON DIMENSIONS

(Unit: mm)

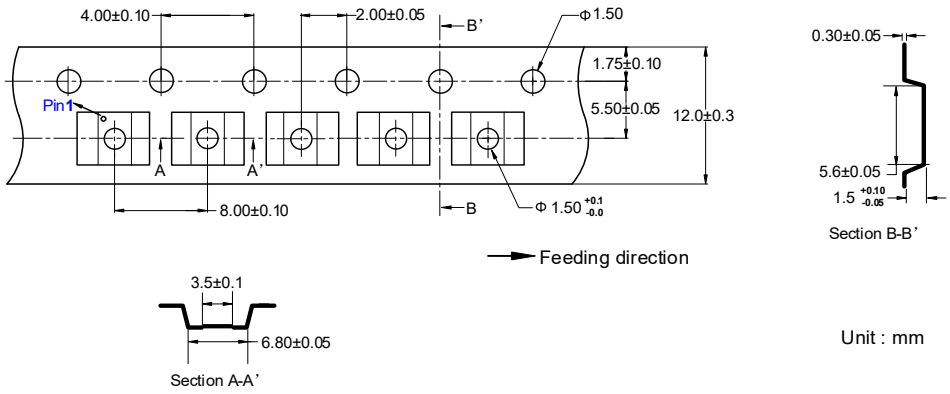
SYMBOL	MIN	MAX
A	--	1.20
A1	0.05	0.15
b	0.19	0.30
c	0.15 REF	
D	4.86	5.10
E	6.20	6.60
E1	4.30	4.50
e	0.65BSC	
L	0.45	0.75
L2	0.25 REF	
θ	0°	8°

Tape Information

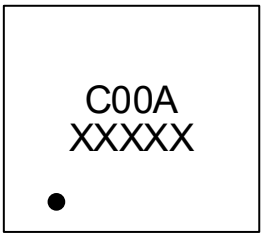
SOP14 (3.9mm × 8.65mm)



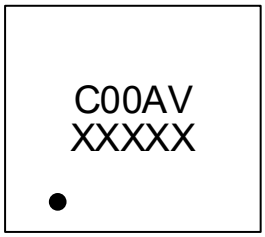
TSSOP14 (4.4mm × 5.0mm)



Marking Information



ET74LVC00AM14
C00A = Part Number
XXXXX = Tracking Number



ET74LVC00AV
C00AV = Part Number
XXXXX = Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
0.0	2025-02-13	Preliminary Version	Wang anran	Tu guozhu	Liu jiaying
0.1	2025-05-27	Update EC Table	Wang anran	Yang xiaoxu	Liu jiaying
1.0	2025-06-20	Official Version	Xu tao	Yang xiaoxu	Liu jiaying
1.0.a	206-04-02	Update Format, Add Tape and Marking	Xu tao	Yang xiaoxu	Liu jiaying