ET74LVC14A - Six channel Schmitt triggered inverter

General Description

The ET74LVC14A is Six channel schmitt triggered inverter that is designed for 1.65V to 5.5V V_{CC} operation.

Features

- Wide Operating Voltage Range: 1.65V to 5.5V
- Max t_{pd} of 6.4ns at 3.3V
- 24mA Balanced Output Sink Capability
- Latch-up performance exceeds 200mA per JESD78, Class II
- ESD protection exceeds JESD22
  - 2000V Human-Body Model (A114-A)
  - 1000V Charged-Device Model (C101)

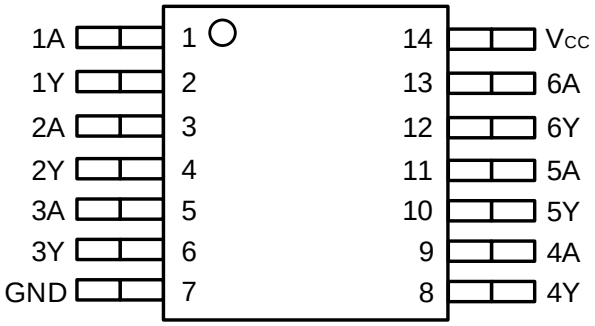
Applications

- Mobile Device
- AV Receiver
- Audio Dock: Portable
- Blu-ray Player and Home Theater
- Personal Digital Assistant (PDA)
- Power: Telecom/Server AC/DC Supply: Single
- Controller: Analog and Digital
- Solid State Drive (SSD): Client and Enterprise
- TV: LCD, Digital, and High-Definition (HDTV)
- Tablet: Enterprise
- Video Analytics: Server
- Wireless Headset, Keyboard, and Mouse

Device Information

Part No.	Package	Size
ET74LVC14AM	SOP14	8.65*6mm
ET74LVC14AV	TSSOP14	4.96*6.4mm

Pin Configuration



ET74LVC14AM (SOP14)
ET74LVC14AV (TSSOP14)
Figure1. Top View

Pin Function

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

Block Diagram

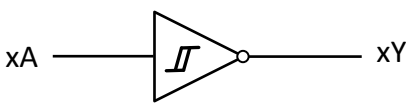


Figure2. Logic Symbol

Functional Description

Function Table

Input	Output
xA	**xY**
L	H
H	L

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		−0.5 to 6.5	V
V_I	Input Voltage		−0.5 to 6.5	V
V_O	Output Voltage		−0.5 to V_{CC} + 0.5	V
I_{IK}	Input Clamp Current (1)	V_I < -0.5V	-50	mA
I_{OK}	Output Clamp Current (1)	V_O < -0.5V or V_O > V_{CC}	±50	mA
I_O	Continuous Output Current		±50	mA
I_{CC}	Continuous Current through V_{CC} or GND		±100	mA
T_J	Max Junction Temperature		150	ºC
T_{LEAD}	Lead Temperature (Soldering 10s)		300	ºC
T_{STG}	Storage Temperature		−65 to 150	ºC

Note1: The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

Recommended Operating Conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage	Operating	1.65	5.5	V
		Data retention only	1.5		V
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	5.5	V
I_{OH}	High-level Output Current	V_{CC} = 1.65 V	-4		mA
		V_{CC} = 2.3 V	-8		mA
		V_{CC} = 2.7 V	-12		mA
		V_{CC} = 3 V	-24		mA
		V_{CC} = 4.5 V	-24		mA
I_{OL}	Low-level Output Current	V_{CC} = 1.65 V		4	mA
		V_{CC} = 2.3 V		8	mA
		V_{CC} = 2.7 V		12	mA
		V_{CC} = 3 V		24	mA
		V_{CC} = 4.5 V		24	mA
T_A	Ambient Temperature	Operating in Free Air	-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	V_{CC}	Operating Free-air Temperature (T_A)							Unit
			T_A=25°C			-40°C≤T_A≤85°C		-40°C≤T_A≤125°C		
			Min	Typ	Max	Min	Max	Min	Max	
V_{T+}	Positive-going Threshold Voltage	1.65V	0.4		1.3	0.4	1.3	0.4	1.3	V
		1.95V	0.6		1.5	0.6	1.5	0.6	1.5	
		2.3V	0.8		1.7	0.8	1.7	0.8	1.7	
		2.5V	0.8		1.7	0.8	1.7	0.8	1.7	
		2.7V	0.8		2	0.8	2	0.8	2	
		3V	0.9		2	0.9	2	0.9	2	
		3.6V	1.1		2	1.1	2	1.1	2	
		4.5V								
		5V								
V_{T-}	Negative-going Threshold Voltage	1.65V	0.15		0.85	0.15	0.85	0.15	0.85	V
		1.95V	0.25		0.95	0.25	0.95	0.25	0.95	
		2.3V	0.4		1.2	0.4	1.2	0.4	1.2	
		2.5V	0.4		1.2	0.4	1.2	0.4	1.2	
		2.7V	0.4		1.4	0.4	1.4	0.4	1.4	
		3V	0.6		1.5	0.6	1.5	0.6	1.5	
		3.6V	0.8		1.7	0.8	1.7	0.8	1.7	
		4.5V								
		5V								
V_H	Hysteresis Voltage	1.65V	0.1		1.15	0.1	1.15	0.1	1.15	V
		1.95V	0.15		1.25	0.15	1.25	0.15	1.25	
		2.3V	0.25		1.3	0.25	1.3	0.25	1.3	
		2.5V	0.25		1.3	0.25	1.3	0.25	1.3	
		2.7V	0.3		1.1	0.3	1.1	0.3	1.1	
		3V	0.3		1.2	0.3	1.2	0.3	1.2	
		3.6V	0.3		1.2	0.3	1.2	0.3	1.2	
		4.5V								
		5V								

DC Electrical Characteristics(continued)

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

Symbol	Parameter	Condition		V_{CC}	Operating Free-air Temperature (T_A)							Unit
					T_A=25°C			-40°C≤T_A≤85°C		-40°C≤T_A≤125°C		
					Min	Typ	Max	Min	Max	Min	Max	
V_{OH}	High −Level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OH} =-100μA	1.65V to 5.5V	V_{CC} - 0.2			V_{CC} - 0.2		V_{CC} - 0.3		V
			I_{OH}=-4mA	1.65V	1.29			1.2		1.05		
			I_{OH}=-8mA	2.3V	1.9			1.7		1.65		
			I_{OH} =-12mA	2.7V	2.2			2.2		2.05		
				3V	2.4			2.4		2.25		
			I_{OH} =-24mA	3V	2.3			2.2		2		
				5.5V	4.8			4.7		4.5		
V_{OL}	Low −Level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OL} =100μA	1.65V to 5.5V			0.1		0.2		0.3	V
			I_{OL}=4mA	1.65V			0.24		0.45		0.6	
			I_{OL}=8mA	2.3V			0.3		0.7		0.75	
			I_{OL} =12mA	2.7V			0.4		0.4		0.6	
			I_{OL} =24mA	3V			0.55		0.55		0.8	
				5.5V			0.55		0.55		0.8	
I_I	Input Leakage Current	V_I = V_{CC} or 0		5.5V			±1		±5		±20	μA
I_{CC}	Supply Current	V_I = V_{CC} or 0, I_O = 0		5.5V			1		10		40	μA
ΔI_{CC}		One Input at V_{CC} - 0.6V, Other Inputs at V_{CC} or GND		1.65V to 5.5V			500		500		5000	μA
C_I	Input Capacitance	V_I = V_{CC} or 0		5.5V		5						pF

Switching Characteristics

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

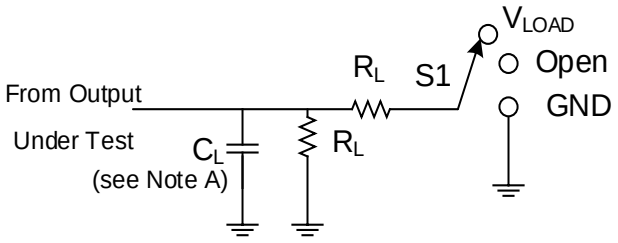
Symbol	Parameter	From	To	V_{CC}	Operating Free-air Temperature (T_A)							Unit
					T_A=25°C			-40°C≤T_A≤85°C		-40°C≤T_A≤125°C		
					Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	Propagation Delay	A or B	Y	1.8 V ± 0.15 V	1	5	10.5	1	11	1	13	ns
				2.5 V ± 0.2 V	1	3.4	7.3	1	7.8	1	10	
				2.7 V	1	3.6	7.3	1	7.5	1	9.5	
				3.3 V ± 0.3 V	1	3.2	6.2	1	6.4	1	8	
				5.5 V								
$T_{sk(o)}$				3.3 V ± 0.3 V			1		1		1.5	ns

Operating Characteristics

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

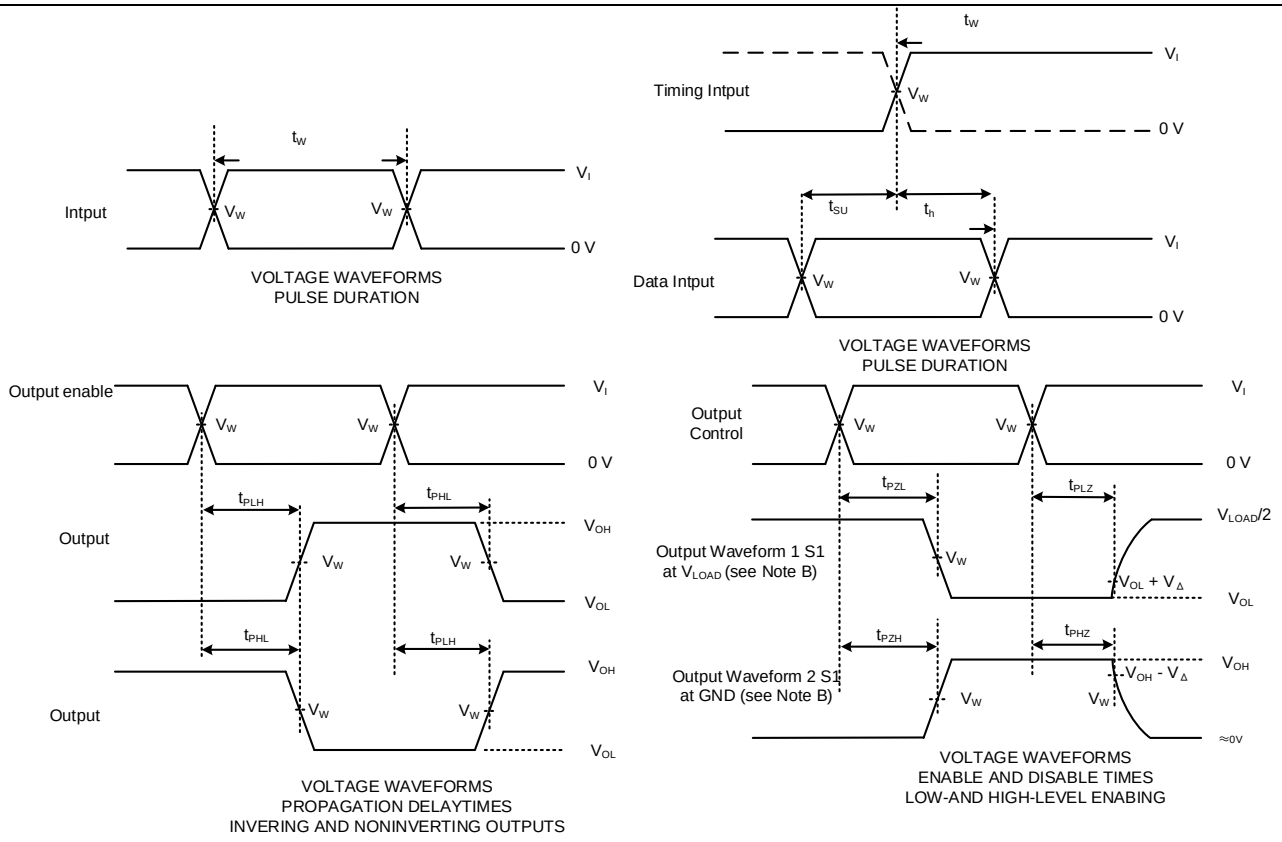
Symbol	Parameter	Condition	V_{CC}	Min	Typ	Max	Unit
C_{PD}	Power Dissipation Capacitance per Buffer and Driver	f = 10 MHz, No Load	1.8 V		11		pF
			2.5 V		12		pF
			3.3 V		15		pF
			5.5 V				pF

Parameter measurement information



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

Figure.3 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 ≤10 MHz, Z_O = 50 Ω

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}.

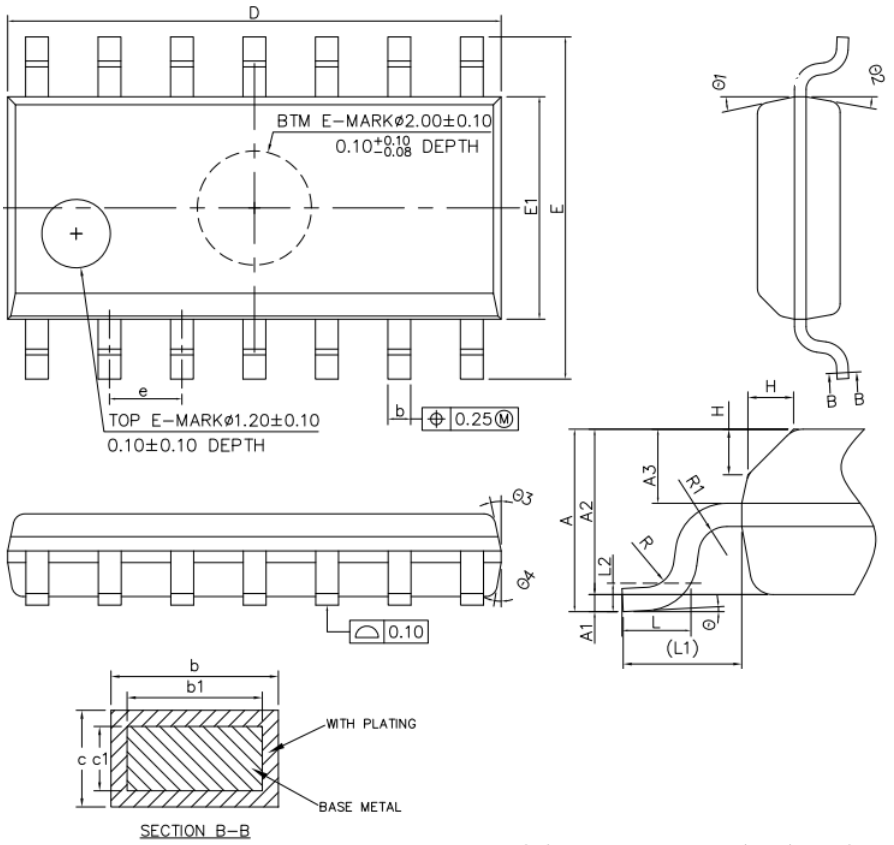
I. All parameters and waveforms are not applicable to all devices.

Figure.4 Input to output propagation delay times

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

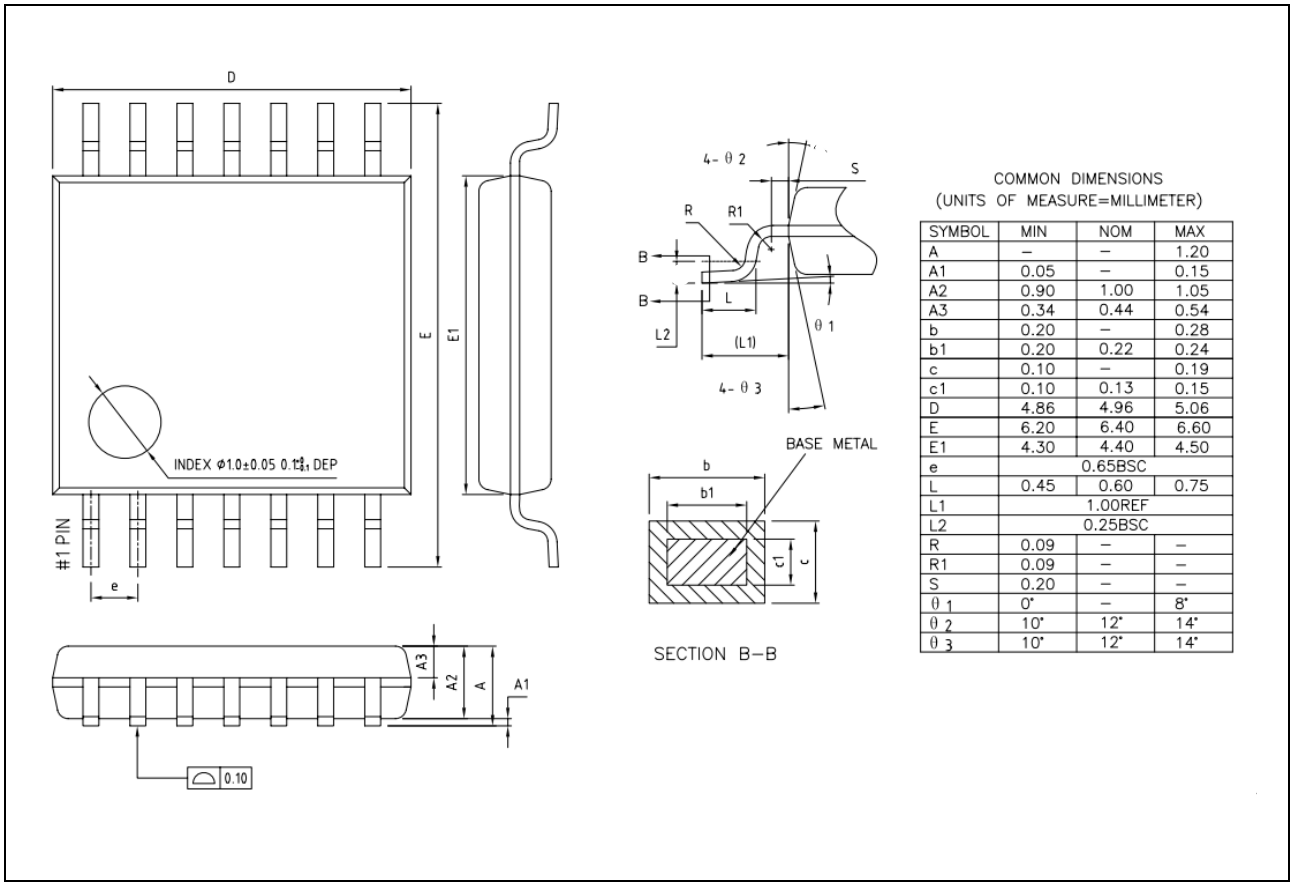
SOP14 (8.65*6mm)



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	–	–	1.75
A1	0.10	0.15	0.25
A2	1.35	1.45	1.55
A3	0.55	0.65	0.75
b	0.36	–	0.51
b1	0.35	0.40	0.45
c	0.18	–	0.25
c1	0.17	0.20	0.23
D	8.55	8.65	8.75
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.22	1.27	1.32
H	0.30	0.40	0.50
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	–	–
R1	0.07	–	–
θ	0°	–	8°
θ1	10°	12°	14°
θ2	8°	10°	12°
θ3	10°	12°	14°
θ4	8°	10°	12°

TSSOP14 (4.96*6.4mm)



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	–	–	1.20
A1	0.05	–	0.15
A2	0.90	1.00	1.05
A3	0.34	0.44	0.54
b	0.20	–	0.28
b1	0.20	0.22	0.24
c	0.10	–	0.19
c1	0.10	0.13	0.15
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e		0.65BSC	
L	0.45	0.60	0.75
L1		1.00REF	
L2		0.25BSC	
R	0.09	–	–
R1	0.09	–	–
S	0.20	–	–
θ1	0°	–	8°
θ2	10°	12°	14°
θ3	10°	12°	14°

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
0.0	2025-02	Preliminary Version	Wangar	Yangxx	Liujy