Hex Inverting Schmitt Trigger

CJ74LVC14 Logic

1 Introduction

The CJ74LVC14 provides six inverting buffers with Schmitt trigger input. It is capable of transforming slowly-changing input signals into sharply defined, jitter-free output signals.

The inputs switch at different points for positive and negative-going signals. The difference between the positive voltage V_{T+} and the negative voltage V_{T-} is defined as the input hysteresis voltage V_H.

Inputs can be driven from either 3.3V or 5V devices. This feature allows the use of this device as a translator in mixed 3.3V and 5V applications.

2 Available Packages

PART NUMBER	PACKAGE
CJ74LVC14	SOP14
	TSSOP14

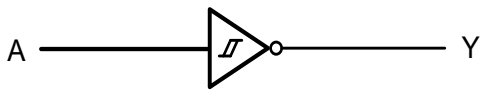
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Wide supply voltage range from 1.2V to 3.6V
- 5V tolerant input for interfacing with 5V logic
- CMOS low power consumption
- Direct interface with TTL levels
- ESD-HBM:2000V
- Specified from -40°C to +125°C

4 Applications

- Barcode scanner
- Cable solutions
- E-books
- Embedded PCs
- Field transmitter: temperature or pressure sensors
- Fingerprint biometrics
- HVAC: heating, ventilating, and air conditioning
- Network attached storage (NAS)
- Server motherboard and PSU
- Software defined radio (SDR)
- TV: High-definition (HDTV), LCD, and digital
- Video communications systems
- Wireless data access cards, headsets, keyboards,mice, and LAN cards



Logic diagram

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74LVC14ADN	SOP14	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74LVC14BDN	TSSOP14	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 Units / Reel	Active

Note:

ECO PLAN: For the RoHS and Green certification standards of this product, please refer to the official report provided by JSCJ.

MSL: Moisture Sensitivity Level. Determined according to JEDEC industry standard classification.

SORT: Specifically defined as follows:
Active: Recommended for new products;
Customized: Products manufactured to meet the specific needs of customers;
Preview: The device has been released and has not been fully mass produced. The sample may or may not be available;
NoRD: It is not recommended to use the device for new design. The device is only produced for the needs of existing customers;
Obsolete: The device has been discontinued.

6 Pin Configuration and Marking Information

6.1 Pin Configuration

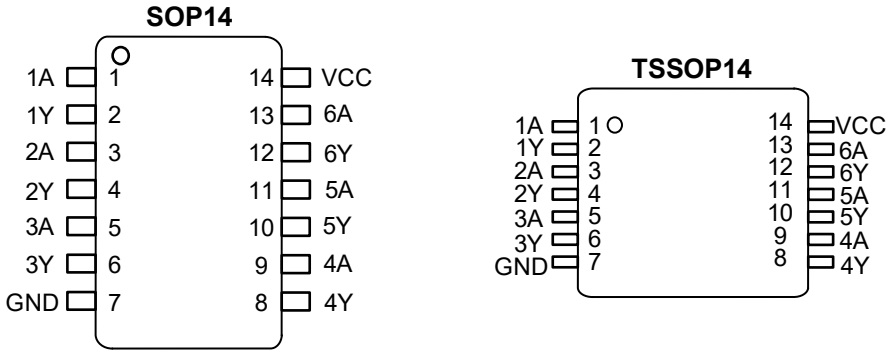


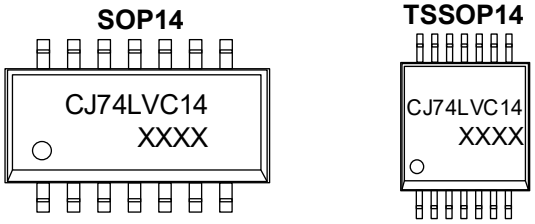
Figure 6-1 Pin configuration

6.2 Pin Function

PIN		I/O(1)	DESCRIPTION
No.	NAME		
1	1A	I	Data input
2	1Y	O	Data output
3	2A	I	Data input
4	2Y	O	Data output
5	3A	I	Data input
6	3Y	O	Data output
7	GND	G	Ground (0V)
8	4Y	O	Data output
9	4A	I	Data input
10	5Y	O	Data output
11	5A	I	Data input
12	6Y	O	Data output
13	6A	I	Data input
14	VCC	P	Supply voltage

(1) I-Input, O-Output, P-Power, G-Ground

6.3 Marking Information



XXXX: Code, indicates weekly record information.

7 Specifications

7.1 Absolute Maximum Ratings

Voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	MAX.	UNIT
V_{CC}	Supply voltage	-		-0.5	+6.5	V
V_I	Input voltage	-		-0.5	+6.5	V
V_O	Output voltage	-		-0.5	V_{CC}+0.5	V
I_{IK}	Input clamping current	V_I < 0V		-50	-	mA
I_{OK}	Output clamping current	V_O > V_{CC} or V_O < 0V		-	±50	mA
I_O	Output current	V_O=0V to V_{CC}		-	±50	mA
I_{CC}	Supply current	-		-	100	mA
I_{GND}	Ground current	-		-100	-	mA
P_{tot}	Total power dissipation	-		-	500	mW
T_{stg}	Storage temperature	-		-65	+150	°C
T_L	Soldering temperature	10s	SOP/TSSOP	-	260	°C

Note: Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to GND. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

7.2 Recommended Operating Conditions

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CC}	Supply voltage	-	1.65	-	3.6	V
		Functional	1.2	-	-	V
V_I	Input voltage	-	0	-	5.5	V
V_O	Output voltage	-	0	-	V_{CC}	V
T_{amb}	Ambient temperature	-	-40	-	+125	°C

7.3 ESD Ratings

SYMBOL	ESD RATINGS		VALUE	UNIT
$V_{ESD-HBM}$	Electrostatic discharge	Human body model (HBM)(1)	±2000	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

7.4 Electrical Characteristics

7.4.1 DC Characteristics 1

T_{amb}=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{OH}	HIGH-level output voltage	$V_I = V_{T+}$ or V_{T-}	I_O=-100uA; V_{CC}=1.65V to 3.6V	V_{CC}-0.2	-	-	V
			I_O=-4mA; V_{CC}=1.65V	1.2	-	-	V
			I_O=-8mA; V_{CC}=2.3V	1.8	-	-	V
			I_O=-12mA; V_{CC}=2.7V	2.2	-	-	V
			I_O=-18mA; V_{CC}=3.0V	2.4	-	-	V
			I_O=-24mA; V_{CC}=3.0V	2.2	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{T+}$ or V_{T-}	I_O=100uA; V_{CC}=1.65V to 3.6V	-	-	0.20	V
			I_O=4mA; V_{CC}=1.65V	-	-	0.45	V
			I_O=8mA; V_{CC}=2.3V	-	-	0.6	V
			I_O=12mA; V_{CC}=2.7V	-	-	0.4	V
			I_O=24mA; V_{CC}=3.0V	-	-	0.55	V
I_I	Input leakage current	V_I=5.5V or GND;V_{CC}=3.6V		-	-	±5	uA
I_{CC}	Supply current	V_I=V_{CC} or GND; I_O=0A; V_{CC}=3.6V		-	-	10	uA
ΔI_{CC}	Additional supply current	Per input pin; V_I=V_{CC}-0.6V; I_O=0A; V_{CC}=2.7V to 3.6V		-	-	500	uA
C_I	Input capacitance	V_{CC}=0V to 3.6V; V_I= GND to V_{CC}		-	4.0	-	pF

7.4.2 DC Characteristics 2

T_{amb}=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{OH}	HIGH-level output voltage	$V_I = V_{T+}$ or V_{T-}	I_O=-100uA; V_{CC}=1.65V to 3.6V	V_{CC}-0.3	-	-	V
			I_O=-4mA; V_{CC}=1.65V	1.05	-	-	V
			I_O=-8mA; V_{CC}=2.3V	1.65	-	-	V
			I_O=-12mA; V_{CC}=2.7V	2.05	-	-	V
			I_O=-18mA; V_{CC}=3.0V	2.25	-	-	V
			I_O=-24mA; V_{CC}=3.0V	2.0	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{T+}$ or V_{T-}	I_O=100uA; V_{CC}=1.65V to 3.6V	-	-	0.3	V
			I_O=4mA; V_{CC}=1.65V	-	-	0.65	V
			I_O=8mA; V_{CC}=2.3V	-	-	0.8	V
			I_O=12mA; V_{CC}=2.7V	-	-	0.6	V
			I_O=24mA; V_{CC}=3.0V	-	-	0.8	V
I_I	Input leakage current	V_I=5.5V or GND; V_{CC}=3.6V		-	-	±20	uA
I_{CC}	Supply current	V_I=V_{CC} or GND; I_O=0A; V_{CC}=3.6V		-	-	40	uA
ΔI_{CC}	Additional supply current	Per input pin; V_I=V_{CC}-0.6V; I_O=0A; V_{CC}=2.7V to 3.6V		-	-	5000	uA

7.4.3 AC Characteristics 1

T_{amb}=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.(1)	MAX.	UNIT
t_{PLH}, t_{PHL}	nA to nY propagation delay	See Figure 8-5	V_{CC}=1.2V	-	11	-	ns
			V_{CC}=1.65V to 1.95V	1.0	7.5	15	ns
			V_{CC}=2.3V to 2.7V	1.5	6.0	12	ns
			V_{CC}=2.7V	1.5	6.0	12	ns
			V_{CC}=3.0V to 3.6V	1.0	5.5	11	ns

(1) Typical values are measured at T_{amb}=25°C and V_{CC}=1.2V, 1.8V, 2.5V, 2.7V and 3.3V respectively.

7.4.4 AC Characteristics 2

T_{amb}=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
t_{PLH}, t_{PHL}	nA to nY propagation delay	See Figure 8-5	V_{CC}=1.65V to 1.95V	1.0	-	16	ns
			V_{CC}=2.3V to 2.7V	1.5	-	13	ns
			V_{CC}=2.7V	1.5	-	13	ns
			V_{CC}=3.0V to 3.6V	1.0	-	12	ns

7.4.5 Transfer Characteristics 1

T_{amb}=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{T+}	Positive-going threshold voltage	See Figure 8-6 and Figure 8-7	V_{CC}=1.2V	0.2	-	1.0	V
			V_{CC}=1.65V	0.4	-	1.3	V
			V_{CC}=1.95V	0.6	-	1.5	V
			V_{CC}=2.3V	0.8	-	1.7	V
			V_{CC}=2.5V	0.9	-	1.7	V
			V_{CC}=2.7V	1.1	-	2	V
			V_{CC}=3V	1.2	-	2	V
			V_{CC}=3.6V	1.2	-	2	V
V_{T-}	Negative-going threshold voltage	See Figure 8-6 and Figure 8-7	V_{CC}=1.2V	0.12	-	0.75	V
			V_{CC}=1.65V	0.15	-	0.85	V
			V_{CC}=1.95V	0.25	-	0.95	V
			V_{CC}=2.3V	0.4	-	1.1	V
			V_{CC}=2.5V	0.4	-	1.2	V
			V_{CC}=2.7V	0.8	-	1.4	V
			V_{CC}=3V	0.8	-	1.5	V
			V_{CC}=3.6V	0.8	-	1.5	V
V_H	Hysteresis voltage	(V_{T+} - V_{T-}); See Figure 8-6 and Figure 8-7	V_{CC}=1.2V	0.1	-	1.0	V
			V_{CC}=1.65V	0.2	-	1.15	V
			V_{CC}=1.95V	0.2	-	1.25	V
			V_{CC}=2.3V	0.3	-	1.3	V
			V_{CC}=2.5V	0.3	-	1.3	V
			V_{CC}=2.7V	0.3	-	1.1	V
			V_{CC}=3V	0.3	-	1.2	V
			V_{CC}=3.6V	0.3	-	1.2	V

7.4.6 Transfer Characteristics 2

T_{amb}=-40°C to +125°C, voltages are referenced to GND (ground = 0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{T+}	Positive-going threshold voltage	See Figure 8-6 and Figure 8-7	V_{CC}=1.2V	0.2	-	1.0	V
			V_{CC}=1.65V	0.4	-	1.3	V
			V_{CC}=1.95V	0.6	-	1.5	V
			V_{CC}=2.3V	0.8	-	1.7	V
			V_{CC}=2.5V	0.9	-	1.7	V
			V_{CC}=2.7V	1.1	-	2	V
			V_{CC}=3V	1.2	-	2	V
			V_{CC}=3.6V	1.2	-	2	V
V_{T-}	Negative-going threshold voltage	See Figure 8-6 and Figure 8-7	V_{CC}=1.2V	0.12	-	0.75	V
			V_{CC}=1.65V	0.15	-	0.85	V
			V_{CC}=1.95V	0.25	-	0.95	V
			V_{CC}=2.3V	0.4	-	1.1	V
			V_{CC}=2.5V	0.4	-	1.2	V
			V_{CC}=2.7V	0.8	-	1.4	V
			V_{CC}=3V	0.8	-	1.5	V
			V_{CC}=3.6V	0.8	-	1.5	V
V_H	Hysteresis voltage	(V_{T+} - V_{T-}); See Figure 8-6 and Figure 8-7	V_{CC}=1.2V	0.1	-	1.0	V
			V_{CC}=1.65V	0.2	-	1.15	V
			V_{CC}=1.95V	0.2	-	1.25	V
			V_{CC}=2.3V	0.3	-	1.3	V
			V_{CC}=2.5V	0.3	-	1.3	V
			V_{CC}=2.7V	0.3	-	1.1	V
			V_{CC}=3V	0.3	-	1.2	V
			V_{CC}=3.6V	0.3	-	1.2	V

8 Detailed Description

8.1 Overview

The CJ74LVC14 provides six inverting buffers with Schmitt trigger input. It is capable of transforming slowly-changing input signals into sharply defined, jitter-free output signals.

The inputs switch at different points for positive and negative-going signals. The difference between the positive voltage V_{T+} and the negative voltage V_{T-} is defined as the input hysteresis voltage V_H.

Inputs can be driven from either 3.3V or 5V devices. This feature allows the use of this device as a translator in mixed 3.3V and 5V applications.

8.2 Functional Block Diagram

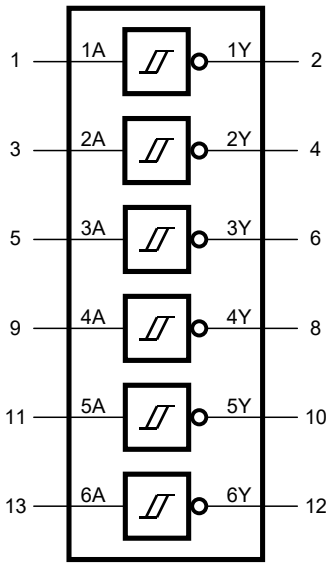


Figure 8-1 Logic symbol

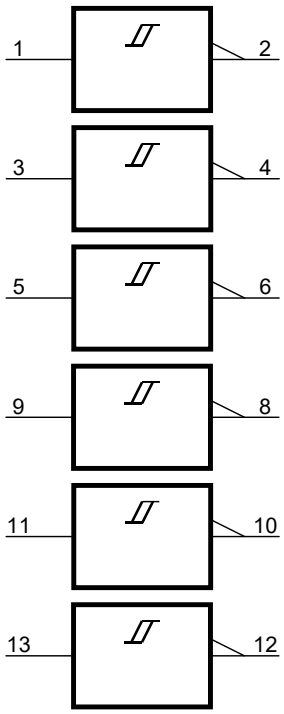


Figure 8-2 IEC Logic symbol

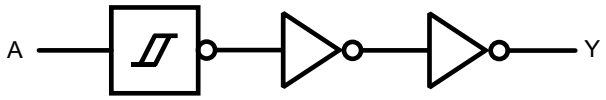


Figure 8-3 Logic diagram for one schmitt trigger

8.3 Function Table(1)

INPUT	OUTPUT
nA	nY
L	H
H	L

（1）H=HIGH voltage level; L=LOW voltage level.

8.4 Testing Circuit

8.4.1 AC Testing Circuit

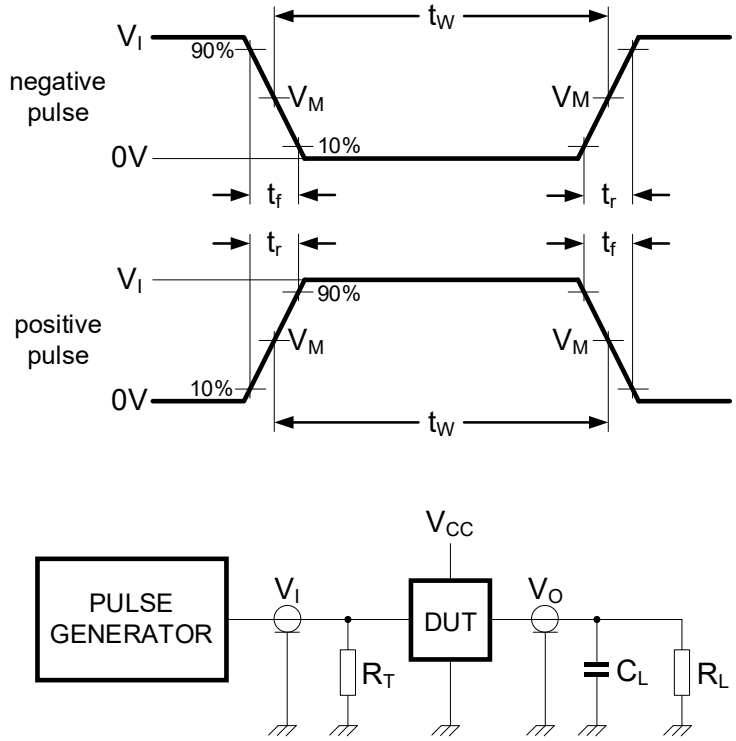


Figure 8-4 Load circuitry for switching times

Definitions for test circuit:

R_L=Load resistance.

C_L=Load capacitance including jig and probe capacitance.

R_T=Termination resistance should be equal to the output impedance Z_o of the pulse generator.

8.4.2 AC Testing Waveforms

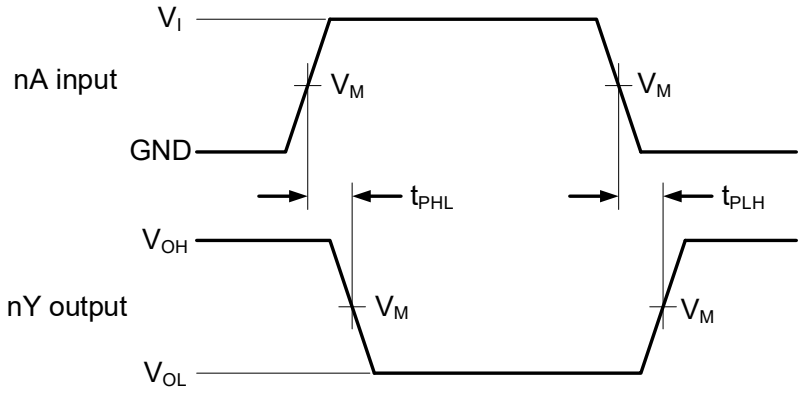


Figure 8-5 Propagation delay input (nA) to output (nY)

8.4.3 Transfer Characteristics Waveforms

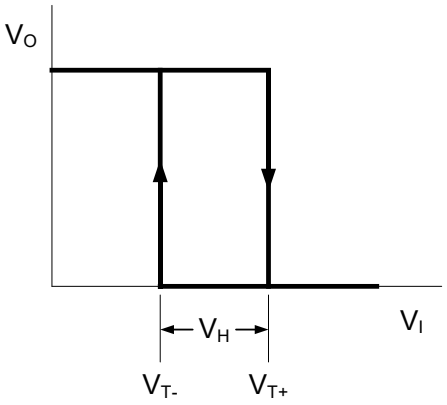


Figure 8-6 Transfer characteristic

V_{T-} at 20% and V_{T+} at 70%:

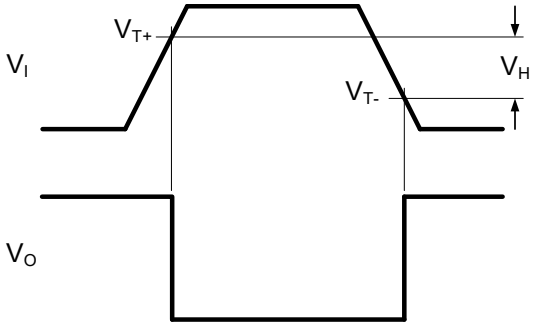


Figure 8-7 Definition of V_{T+}, V_{T-} and V_H

8.4.4 Measurement Points

SUPPLY VOLTAGE	INPUT	OUTPUT
V_{CC}	V_M	V_M
< 2.7V	0.5xV_{CC}	0.5xV_{CC}
≥ 2.7V	1.5V	1.5V

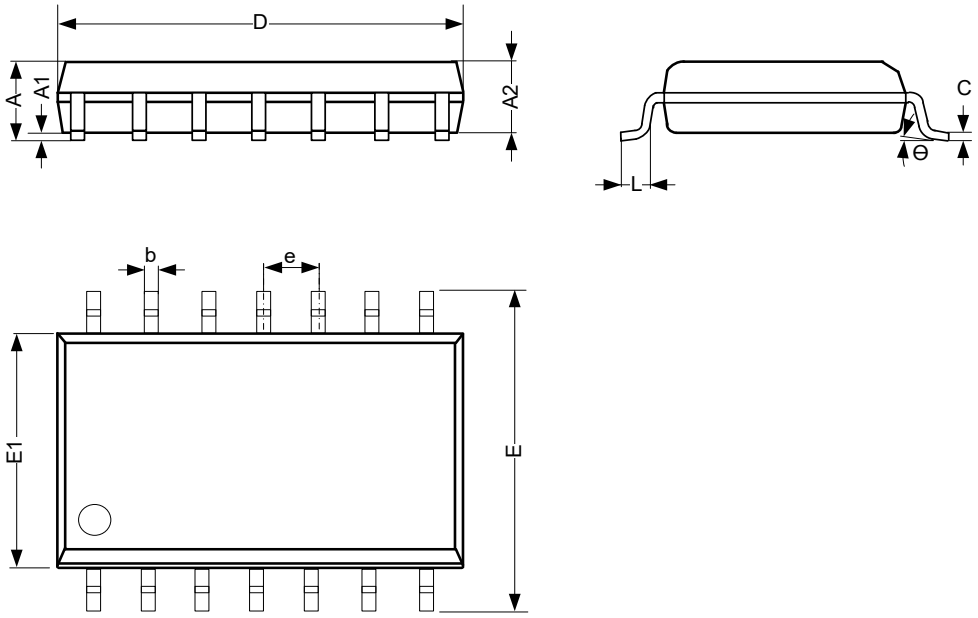
8.4.5 Test Data

SUPPLY VOLTAGE	INPUT		LOAD	
V_{CC}	V_I	t_r, t_f	C_L	R_L
1.2V	V_{CC}	≤3ns	30pF	1kΩ
1.65V to 1.95V	V_{CC}	≤3ns	30pF	1kΩ
2.3V to 2.7V	V_{CC}	≤3ns	30pF	500Ω
2.7V	2.7V	≤3ns	50pF	500Ω
3.0V to 3.6V	2.7V	≤3ns	50pF	500Ω

9 Mechanical Information

9.1 SOP14 Mechanical Information

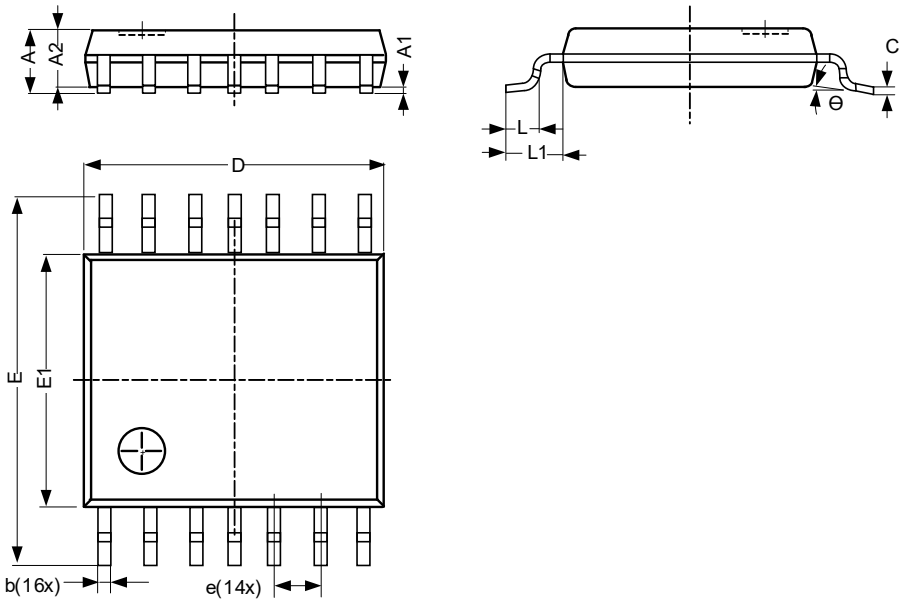
9.1.1 SOP14 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.50	-	1.75
A1	0.05	-	0.25
A2	1.30	-	-
b	0.33	-	0.50
c	0.19	-	0.25
D	8.43	-	8.76
E	5.80	-	6.25
E1	3.75	-	4.00
e	1.27 BSC		
L	0.40	-	0.89
Θ	0°	-	8°
Unit: mm			

9.2 TSSOP14 Mechanical Information

9.2.1 TSSOP14 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.20
A1	0.05	-	0.15
A2	0.80	-	1.05
b	0.19	-	0.30
c	0.09	-	0.20
D	4.90	-	5.10
E	6.20	-	6.60
E1	4.30	-	4.50
e	0.65 BSC		
L	0.45	-	0.75
L1	-	1.00	-
Θ	0°	-	8°
Unit: mm			

10 Notes and Revision History

10.1 Associated Product Family and Others

To view other products of the same type or IC products of other types, click the official website of JSCJ -- ***https:www.jscj-elec.com*** for more details.

10.2 Notes

Electrostatic Discharge Caution

This IC may be damaged by ESD. Relevant personnel shall comply with correct installation and use specifications to avoid ESD damage to the IC. If appropriate measures are not taken to prevent ESD damage, the hazards caused by ESD include but are not limited to degradation of integrated circuit performance or complete damage of integrated circuit. For some precision integrated circuits, a very small parameter change may cause the whole device to be inconsistent with its published specifications.

10.3 Revision History

August, 2025: rev - 1.1, Correct symbol from V_I to V_O in 7.2.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

The information in this data sheet is intended to describe the operation and characteristics of our products. JSCJ has the right to make any modification, enhancement, improvement, correction or other changes to any content in this data sheet, including but not limited to specification parameters, circuit design and application information, without prior notice.

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