

Single Inverter Schmitt Trigger

CJ74LVC1G14 Logic

1 Introduction

The CJ74LVC1G14 provides the inverting buffer function with Schmitt-trigger input. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment. Schmitt-trigger action at the input makes the circuit tolerant for slower input rise and fall time.

This device is fully specified for partial power-down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

2 Available Packages

PART NUMBER	PACKAGE
CJ74LVC1G14	SOT-23-5L
	SOT-353

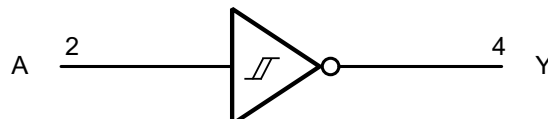
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Wide supply voltage range from 1.65V to 5.5V
- $\pm 24\text{mA}$ output drive ($V_{CC}=3.0\text{V}$)
- CMOS low power consumption
- Direct interface with TTL levels
- Unlimited rise and fall times
- Input accepts voltages up to 5V
- Specified from -40°C to $+125^{\circ}\text{C}$

4 Applications

- AV Receiver
- Audio Dock: Portable
- Blu-ray Player and Home Theater
- Embedded PC
- MP3 Player/Recorder (Portable Audio)
- 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



Simplified schematic

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74LVC1G14M5N	SOT-23-5L	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74LVC1G14R5N	SOT-353	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 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

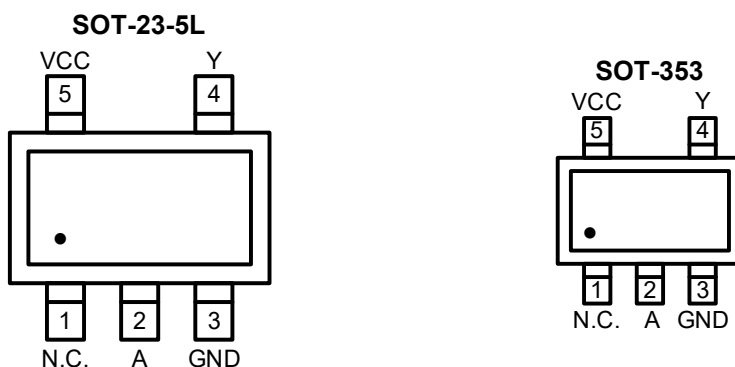


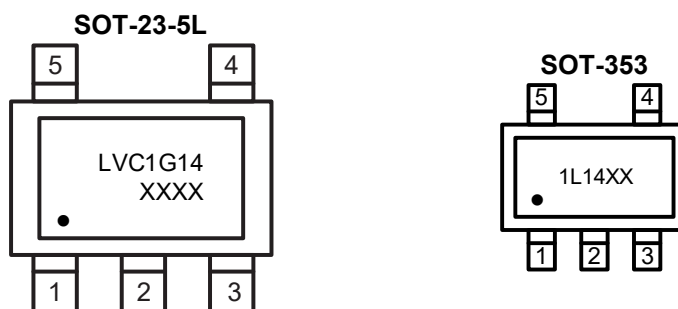
Figure 6-1 Pin configuration

6.2 Pin Function

PIN		I/O ⁽¹⁾	DESCRIPTION
No.	NAME		
1	N.C.	-	Not connected
2	A	I	Data input
3	GND	G	Ground (0V)
4	Y	O	Data output
5	VCC	P	Supply voltage

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

6.3 Marking Information



XXXX or XX: 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	Active mode	-0.5	V _{CC} +0.5	V
		Power-down mode; V _{CC} =0V	-0.5	+6.5	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
T _{stg}	Storage temperature	-	-65	+150	°C
P _{tot}	Total power dissipation	-	-	250	mW
T _L	Soldering temperature	10s	-	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	-	5.5	V
V _I	Input voltage	-	0	-	5.5	V
V _O	Output voltage	Active mode	0	-	V _{CC}	V
		Power-down mode; V _{CC} =0V	0	-	5.5	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

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{T+}	Positive-going threshold voltage	$V_{CC}=1.8\text{V}$	0.82	1.02	1.2	V
		$V_{CC}=2.3\text{V}$	1.03	1.25	1.45	V
		$V_{CC}=3.0\text{V}$	1.29	1.5	1.71	V
		$V_{CC}=4.5\text{V}$	1.84	2.15	2.41	V
		$V_{CC}=5.5\text{V}$	2.19	2.6	2.91	V
V_{T-}	Negative-going threshold voltage	$V_{CC}=1.8\text{V}$	0.45	0.6	0.75	V
		$V_{CC}=2.3\text{V}$	0.64	0.8	0.96	V
		$V_{CC}=3.0\text{V}$	0.86	1.1	1.34	V
		$V_{CC}=4.5\text{V}$	1.35	1.75	2.09	V
		$V_{CC}=5.5\text{V}$	1.61	2.15	2.59	V
V_H	Hysteresis voltage	$V_{CC}=1.8\text{V}$	0.24	0.4	0.54	V
		$V_{CC}=2.3\text{V}$	0.26	0.4	0.57	V
		$V_{CC}=3.0\text{V}$	0.27	0.42	0.64	V
		$V_{CC}=4.5\text{V}$	0.28	0.45	0.65	V
		$V_{CC}=5.5\text{V}$	0.29	0.47	0.75	V
V_{OH}	HIGH-level output voltage	$V_I = V_{T+}$ or V_{T-}	$I_O = -100\mu\text{A}; V_{CC}=1.65\text{V to } 5.5\text{V}$	$V_{CC} - 0.1$	-	V
			$I_O = -4\text{mA}; V_{CC}=1.65\text{V}$	1.2	1.54	V
			$I_O = -8\text{mA}; V_{CC}=2.3\text{V}$	1.9	2.15	V
			$I_O = -12\text{mA}; V_{CC}=2.7\text{V}$	2.2	2.50	V
			$I_O = -24\text{mA}; V_{CC}=3.0\text{V}$	2.3	2.62	V
			$I_O = -32\text{mA}; V_{CC}=4.5\text{V}$	3.8	4.11	V
V_{OL}	LOW-level output voltage	$V_I = V_{T+}$ or V_{T-}	$I_O = 100\mu\text{A}; V_{CC}=1.65\text{V to } 5.5\text{V}$	-	-	V
			$I_O = 4\text{mA}; V_{CC}=1.65\text{V}$	-	0.07	V
			$I_O = 8\text{mA}; V_{CC}=2.3\text{V}$	-	0.12	V
			$I_O = 12\text{mA}; V_{CC}=2.7\text{V}$	-	0.17	V
			$I_O = 24\text{mA}; V_{CC}=3.0\text{V}$	-	0.33	V
			$I_O = 32\text{mA}; V_{CC}=4.5\text{V}$	-	0.39	V
I_I	Input leakage current	$V_I=5.5\text{V}$ or GND; $V_{CC}=0\text{V to } 5.5\text{V}$	-	-	± 1	μA
I_{OFF}	Power-off leakage current	V_I or $V_O=5.5\text{V}; V_{CC}=0\text{V}$	-	-	± 2	μA
I_{CC}	Supply current	$V_I=5.5\text{V}$ or GND; $I_O=0\text{A}; V_{CC}=1.65\text{V to } 5.5\text{V}$	-	-	4	μA
ΔI_{CC}	Additional supply current	$V_I=V_{CC}-0.6\text{V}; I_O=0\text{A}; V_{CC}=2.3\text{V to } 5.5\text{V}$	-	-	500	μA

Note: All typical values are measured at maximum V_{CC} and $T_{amb}=25^{\circ}\text{C}$.

7.4.2 DC Characteristics 2

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V _{T+}	Positive-going threshold voltage	V _{CC} =1.8V		0.79	-	1.2	V
		V _{CC} =2.3V		1.00	-	1.45	V
		V _{CC} =3.0V		1.26	-	1.71	V
		V _{CC} =4.5V		1.81	-	2.41	V
		V _{CC} =5.5V		2.16	-	2.91	V
V _{T-}	Negative-going threshold voltage	V _{CC} =1.8V		0.45	-	0.78	V
		V _{CC} =2.3V		0.64	-	0.99	V
		V _{CC} =3.0V		0.86	-	1.37	V
		V _{CC} =4.5V		1.35	-	2.12	V
		V _{CC} =5.5V		1.61	-	2.62	V
V _H	Hysteresis voltage	V _{CC} =1.8V		0.17	-	0.54	V
		V _{CC} =2.3V		0.20	-	0.57	V
		V _{CC} =3.0V		0.21	-	0.64	V
		V _{CC} =4.5V		0.22	-	0.65	V
		V _{CC} =5.5V		0.23	-	0.75	V
V _{OH}	HIGH-level output voltage	V _I = V _{T+} or V _{T-}	I _O =-100uA; V _{CC} =1.65V to 5.5V	V _{CC} - 0.1	-	-	V
			I _O =-4mA; V _{CC} =1.65V	0.95	-	-	V
			I _O =-8mA; V _{CC} =2.3V	1.7	-	-	V
			I _O =-12mA; V _{CC} =2.7V	1.9	-	-	V
			I _O =-24mA; V _{CC} =3.0V	2.0	-	-	V
			I _O =-32mA; V _{CC} =4.5V	3.4	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{T+} or V _{T-}	I _O =100uA; V _{CC} =1.65V to 5.5V	-	-	0.10	V
			I _O =4mA; V _{CC} =1.65V	-	-	0.70	V
			I _O =8mA; V _{CC} =2.3V	-	-	0.45	V
			I _O =12mA; V _{CC} =2.7V	-	-	0.60	V
			I _O =24mA; V _{CC} =3.0V	-	-	0.80	V
			I _O =32mA; V _{CC} =4.5V	-	-	0.80	V
I _I	Input leakage current	V _I =5.5V or GND; V _{CC} =0V to 5.5V		-	-	±1	uA
I _{OFF}	Power-off leakage current	V _I or V _O =5.5V; V _{CC} =0V		-	-	±2	uA
I _{CC}	Supply current	V _I =5.5V or GND; I _O =0A; V _{CC} =1.65V to 5.5V		-	-	4	uA
ΔI _{CC}	Additional supply current	V _I =V _{CC} -0.6V; I _O =0A; V _{CC} =2.3V to 5.5V		-	-	500	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.	MAX.	UNIT
t _{PLH}	A to Y propagation delay	See Figure 8-4	V _{CC} =1.65V to 1.95V	-	14	21	ns
			V _{CC} =2.3V to 2.7V	-	10	15	ns
			V _{CC} =2.7V	-	9	13.5	ns
			V _{CC} =3.0V to 3.6V	-	8	12	ns
			V _{CC} =4.5V to 5.5V	-	7	10.5	ns
t _{PHL}	A to Y propagation delay	See Figure 8-4	V _{CC} =1.65V to 1.95V	-	12.5	18.8	ns
			V _{CC} =2.3V to 2.7V	-	11	16.5	ns
			V _{CC} =2.7V	-	11	16.5	ns
			V _{CC} =3.0V to 3.6V	-	11	16.5	ns
			V _{CC} =4.5V to 5.5V	-	10	15	ns

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}	A to Y propagation delay	See Figure 8-4	V _{CC} =1.65V to 1.95V	-	-	23	ns
			V _{CC} =2.3V to 2.7V	-	-	17	ns
			V _{CC} =2.7V	-	-	15.5	ns
			V _{CC} =3.0V to 3.6V	-	-	14	ns
			V _{CC} =4.5V to 5.5V	-	-	12.5	ns
t _{PHL}	A to Y propagation delay	See Figure 8-4	V _{CC} =1.65V to 1.95V	-	-	20.8	ns
			V _{CC} =2.3V to 2.7V	-	-	18.5	ns
			V _{CC} =2.7V	-	-	18.5	ns
			V _{CC} =3.0V to 3.6V	-	-	18.5	ns
			V _{CC} =4.5V to 5.5V	-	-	17	ns

8 Detailed Description

8.1 Overview

The CJ74LVC1G14 provides the inverting buffer function with Schmitt-trigger input. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment. Schmitt-trigger action at the input makes the circuit tolerant for slower input rise and fall time.

This device is fully specified for partial power-down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

8.2 Functional Block Diagram

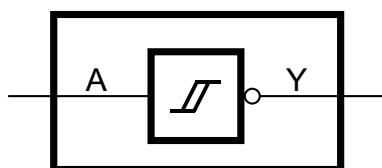


Figure 8-1 Logic symbol

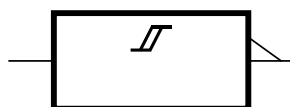


Figure 8-2 IEC logic symbol

8.3 Function Table⁽¹⁾

INPUT	OUTPUT
A	Y
L	H
H	L

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

8.4 Testing Circuit

8.4.1 AC Testing Circuit

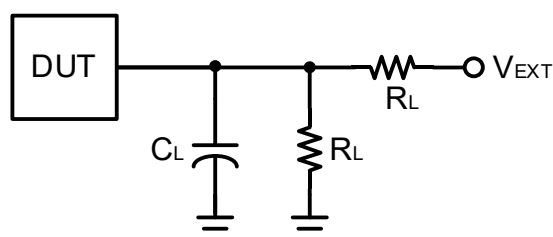


Figure 8-3 Test circuit for measuring switching times

Definitions for test circuit:

C_L =Load capacitance including jig and probe capacitance.

8.4.2 AC Testing Waveforms

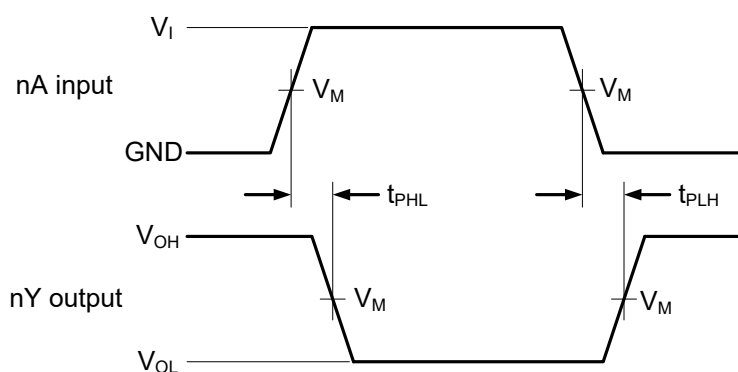


Figure 8-4 The data input (A) to output (Y) propagation delays

8.4.3 Measurement Points

SUPPLY VOLTAGE	INPUT	OUTPUT
V_{CC}	V_M	V_M
1.65V to 1.95V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.3V to 2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.7V	1.5V	1.5V
3.0V to 3.6V	1.5V	1.5V
4.5V to 5.5V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

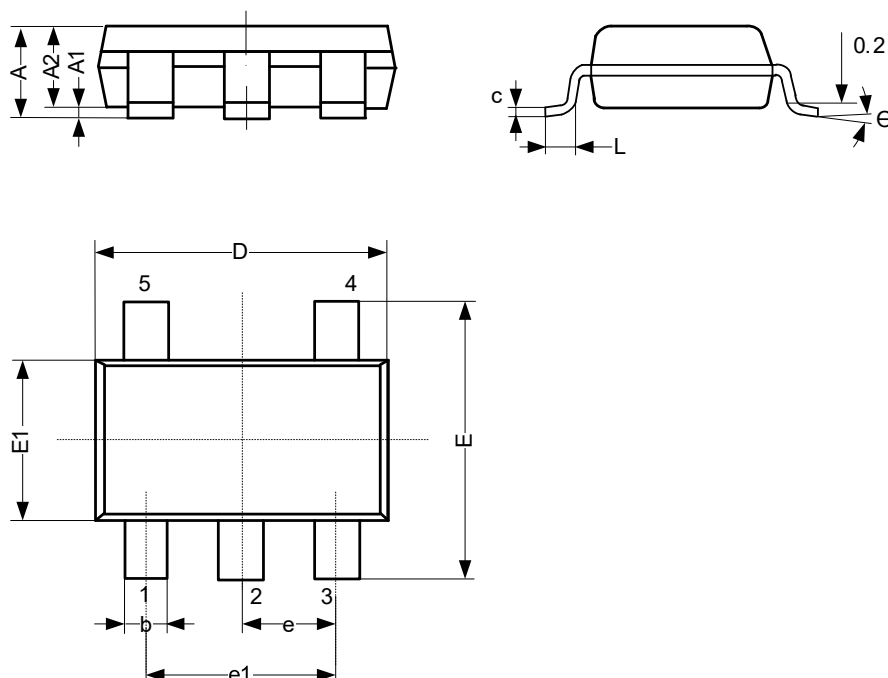
8.4.4 Test Data

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}
V_{CC}	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}, t_{PHL}
1.65V to 1.95V	V_{CC}	$\leq 3ns$	30pF	1k Ω	Open
2.3V to 2.7V	V_{CC}	$\leq 3ns$	30pF	500 Ω	Open
2.7V	2.7V	$\leq 3ns$	50pF	500 Ω	Open
3.0V to 3.6V	2.7V	$\leq 3ns$	50pF	500 Ω	Open
4.5V to 5.5V	V_{CC}	$\leq 3ns$	50pF	500 Ω	Open

9 Mechanical Information

9.1 SOT-23-5L Mechanical Information

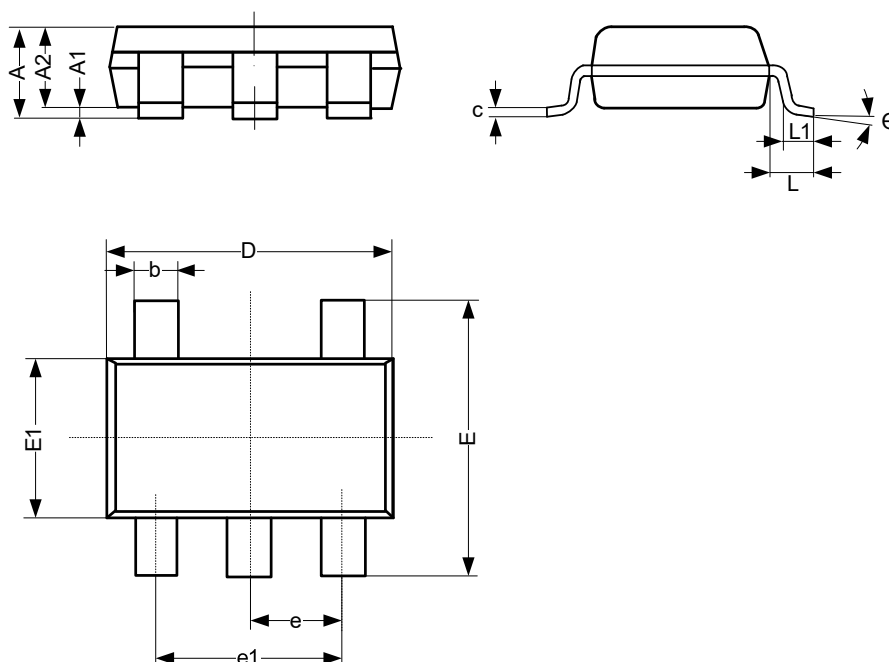
9.1.1 SOT-23-5L Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.26
A1	0.00	-	0.12
A2	1.00	-	1.20
b	0.30	-	0.50
c	0.10	-	0.20
D	2.82	-	3.02
E	2.60	-	3.00
E1	1.50	-	1.70
e	0.95 BSC		
e1	1.80	-	2.00
L	0.30	-	0.60
θ	0°	-	8°
Unit: mm			

9.2 SOT-353 Mechanical Information

9.2.1 SOT-353 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.90	-	1.10
A1	0.00	-	0.10
A2	0.90	-	1.00
b	0.15	-	0.35
c	0.11	-	0.175
D	2.00	-	2.20
E	2.15	-	2.45
E1	1.15	-	1.35
e	0.65 BSC		
e1	1.20	-	1.40
L	-	0.525	-
L1	0.26	-	0.46
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.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

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