



Single 2-input Exclusive-or Gate

**CJ74LVC1G86** Logic

**1 Introduction**

The CJ74LVC1G86 provides the 2-input EXCLUSIVE-OR function.

Inputs can be driven from either 3.3V or 5V devices. These features allow the use of these devices in a mixed 3.3V and 5V environment.

**2 Available Packages**

PART NUMBER	PACKAGE
CJ74LVC1G86	SOT-23-5L
	SOT-353

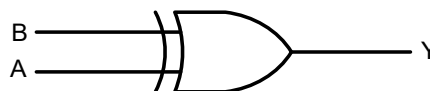
**Note:** For all available packages, please refer to the part Orderable Information.

**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
- Input accepts voltages up to 5V
- Specified from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$

**4 Applications**

- Wireless Headsets
- Motor Drives and Controls
- TVs
- Set-Top Boxes
- Audio



Functional block diagram

**5 Orderable Information**

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74LVC1G86M5N	SOT-23-5L	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74LVC1G86R5N	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

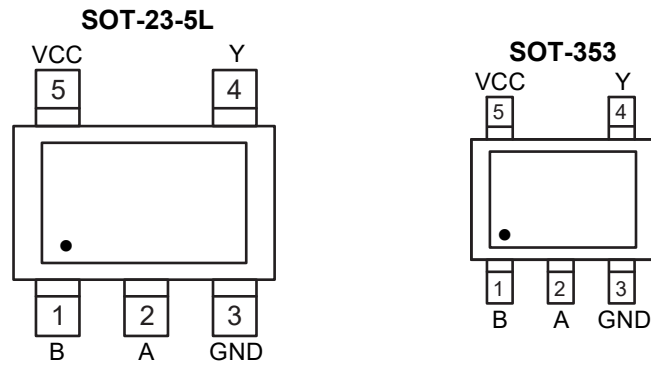


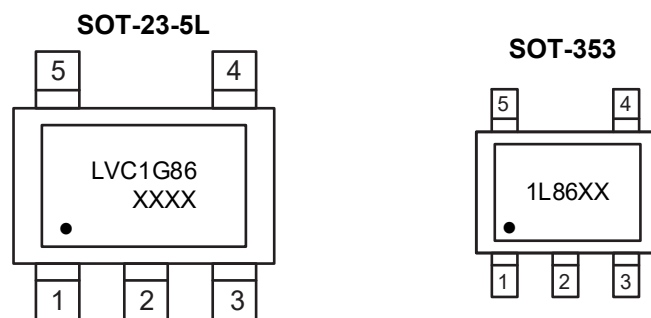
Figure 6-1 Pin configuration

### 6.2 Pin Function

PIN		I/O <sup>(1)</sup>	DESCRIPTION
No.	NAME		
1	B	I	Data input
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	-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 $V_O < 0V$	-	$\pm 50$	mA
$I_O$	Output current	$V_O=0V$ to $V_{CC}$	-	$\pm 50$	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 Electrical Characteristics**
**7.3.1 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	
$V_{IH}$	HIGH-level input voltage	$V_{CC}=1.65\text{V}$ to $1.95\text{V}$	$0.65 \times V_{CC}$	-	-	V	
		$V_{CC}=2.3\text{V}$ to $2.7\text{V}$	1.7	-	-	V	
		$V_{CC}=2.7\text{V}$ to $3.6\text{V}$	2.0	-	-	V	
		$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	$0.7 \times V_{CC}$	-	-	V	
$V_{IL}$	LOW-level input voltage	$V_{CC}=1.65\text{V}$ to $1.95\text{V}$	-	-	$0.35 \times V_{CC}$	V	
		$V_{CC}=2.3\text{V}$ to $2.7\text{V}$	-	-	0.7	V	
		$V_{CC}=2.7\text{V}$ to $3.6\text{V}$	-	-	0.8	V	
		$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	-	$0.3 \times V_{CC}$	V	
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_o = -100\mu\text{A}$ ; $V_{CC}=1.65\text{V}$ to $5.5\text{V}$	$V_{CC}-0.1$	-	-	V
			$I_o = -4\text{mA}$ ; $V_{CC}=1.65\text{V}$	1.2	-	-	V
			$I_o = -8\text{mA}$ ; $V_{CC}=2.3\text{V}$	1.9	-	-	V
			$I_o = -12\text{mA}$ ; $V_{CC}=2.7\text{V}$	2.2	-	-	V
			$I_o = -24\text{mA}$ ; $V_{CC}=3.0\text{V}$	2.3	-	-	V
			$I_o = -32\text{mA}$ ; $V_{CC}=4.5\text{V}$	3.8	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$	$I_o = 100\mu\text{A}$ ; $V_{CC}=1.65\text{V}$ to $5.5\text{V}$	-	-	0.10	V
			$I_o = 4\text{mA}$ ; $V_{CC}=1.65\text{V}$	-	-	0.45	V
			$I_o = 8\text{mA}$ ; $V_{CC}=2.3\text{V}$	-	-	0.30	V
			$I_o = 12\text{mA}$ ; $V_{CC}=2.7\text{V}$	-	-	0.40	V
			$I_o = 24\text{mA}$ ; $V_{CC}=3.0\text{V}$	-	-	0.55	V
			$I_o = 32\text{mA}$ ; $V_{CC}=4.5\text{V}$	-	-	0.55	V
$I_i$	Input leakage current	$V_I=5.5\text{V}$ or GND; $V_{CC}=0\text{V}$ to $5.5\text{V}$	-	-	$\pm 1$	$\mu\text{A}$	
$I_{OFF}$	Power-off leakage current	$V_I$ or $V_O=5.5\text{V}$ ; $V_{CC}=0\text{V}$	-	-	$\pm 2$	$\mu\text{A}$	
$I_{CC}$	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	$\mu\text{A}$	
$\Delta I_{CC}$	Additional supply current	Per pin; $V_I=V_{CC}-0.6\text{V}$ ; $I_o=0\text{A}$ ; $V_{CC}=2.3\text{V}$ to $5.5\text{V}$	-	-	500	$\mu\text{A}$	
$C_i$	Input capacitance	$V_{CC}=3.3\text{V}$ ; $V_I=\text{GND}$ to $V_{CC}$	-	5	-	pF	

**Note:** All typical values are measured at  $V_{CC}=3.3\text{V}$  and  $T_{amb}=25^{\circ}\text{C}$ .

**7.3.2 DC Characteristics 2**

T<sub>amb</sub> = -40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> =1.65V to 1.95V		0.65xV <sub>CC</sub>	-	-	V
		V <sub>CC</sub> =2.3V to 2.7V		1.7	-	-	V
		V <sub>CC</sub> =2.7V to 3.6V		2.0	-	-	V
		V <sub>CC</sub> =4.5V to 5.5V		0.7xV <sub>CC</sub>	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> =1.65V to 1.95V		-	-	0.35xV <sub>CC</sub>	V
		V <sub>CC</sub> =2.3V to 2.7V		-	-	0.7	V
		V <sub>CC</sub> =2.7V to 3.6V		-	-	0.8	V
		V <sub>CC</sub> =4.5V to 5.5V		-	-	0.3xV <sub>CC</sub>	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>o</sub> =-100uA; V <sub>CC</sub> =1.65V to 5.5V	V <sub>CC</sub> -0.1	-	-	V
			I <sub>o</sub> =-4mA; V <sub>CC</sub> =1.65V	0.95	-	-	V
			I <sub>o</sub> =-8mA; V <sub>CC</sub> =2.3V	1.7	-	-	V
			I <sub>o</sub> =-12mA; V <sub>CC</sub> =2.7V	1.9	-	-	V
			I <sub>o</sub> =-24mA; V <sub>CC</sub> =3.0V	2.0	-	-	V
			I <sub>o</sub> =-32mA; V <sub>CC</sub> =4.5V	3.4	-	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>o</sub> =100uA; V <sub>CC</sub> =1.65V to 5.5V	-	-	0.10	V
			I <sub>o</sub> =4mA; V <sub>CC</sub> =1.65V	-	-	0.70	V
			I <sub>o</sub> =8mA; V <sub>CC</sub> =2.3V	-	-	0.45	V
			I <sub>o</sub> =12mA; V <sub>CC</sub> =2.7V	-	-	0.60	V
			I <sub>o</sub> =24mA; V <sub>CC</sub> =3.0V	-	-	0.80	V
			I <sub>o</sub> =32mA; V <sub>CC</sub> =4.5V	-	-	0.80	V
I <sub>I</sub>	Input leakage current	V <sub>I</sub> =5.5V or GND; V <sub>CC</sub> =0V to 5.5V		-	-	±1	uA
I <sub>OFF</sub>	Power-off leakage current	V <sub>I</sub> or V <sub>O</sub> =5.5V; V <sub>CC</sub> =0V		-	-	±2	uA
I <sub>CC</sub>	Supply current	V <sub>I</sub> =5.5V or GND; I <sub>o</sub> =0A; V <sub>CC</sub> =1.65V to 5.5V		-	-	4	uA
ΔI <sub>CC</sub>	Additional supply current	Per pin; V <sub>I</sub> =V <sub>CC</sub> -0.6V; I <sub>o</sub> =0A; V <sub>CC</sub> =2.3V to 5.5V		-	-	500	uA

**7.3.3 AC 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. <sup>(1)</sup>	MAX.	UNIT
$t_{PHL}$	A, B to Y propagation delay	See Figure 8-5	$V_{CC}=1.65\text{V}$ to $1.95\text{V}$	-	12.5	18.8	ns
			$V_{CC}=2.3\text{V}$ to $2.7\text{V}$	-	10.5	15.8	ns
			$V_{CC}=2.7\text{V}$	-	10	15	ns
			$V_{CC}=3.0\text{V}$ to $3.6\text{V}$	-	9.5	14.3	ns
			$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	9	13.5	ns
$t_{PLH}$	A, B to Y propagation delay	See Figure 8-5	$V_{CC}=1.65\text{V}$ to $1.95\text{V}$	-	14	21	ns
			$V_{CC}=2.3\text{V}$ to $2.7\text{V}$	-	10	15	ns
			$V_{CC}=2.7\text{V}$	-	9.5	14.3	ns
			$V_{CC}=3.0\text{V}$ to $3.6\text{V}$	-	8.5	12.8	ns
			$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	7.5	11.3	ns

(1) Typical values are measured at  $T_{amb}=25^{\circ}\text{C}$  and  $V_{CC}=1.8\text{V}$ ,  $2.5\text{V}$ ,  $2.7\text{V}$ ,  $3.3\text{V}$  and  $5.0\text{V}$  respectively.

**7.3.4 AC 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
$t_{PHL}$	A, B to Y propagation delay	See Figure 8-5	$V_{CC}=1.65\text{V}$ to $1.95\text{V}$	-	-	20.8	ns
			$V_{CC}=2.3\text{V}$ to $2.7\text{V}$	-	-	17.8	ns
			$V_{CC}=2.7\text{V}$	-	-	17	ns
			$V_{CC}=3.0\text{V}$ to $3.6\text{V}$	-	-	16.3	ns
			$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	-	15.5	ns
$t_{PLH}$	A, B to Y propagation delay	See Figure 8-5	$V_{CC}=1.65\text{V}$ to $1.95\text{V}$	-	-	23	ns
			$V_{CC}=2.3\text{V}$ to $2.7\text{V}$	-	-	17	ns
			$V_{CC}=2.7\text{V}$	-	-	16.3	ns
			$V_{CC}=3.0\text{V}$ to $3.6\text{V}$	-	-	14.8	ns
			$V_{CC}=4.5\text{V}$ to $5.5\text{V}$	-	-	13.3	ns

## 8 Detailed Description

### 8.1 Overview

The CJ74LVC1G86 provides the 2-input EXCLUSIVE-OR function.

Inputs can be driven from either 3.3V or 5V devices. These features allow the use of these devices in a mixed 3.3V and 5V environment.

### 8.2 Functional Block Diagram

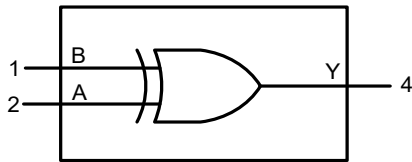


Figure 8-1 Logic symbol

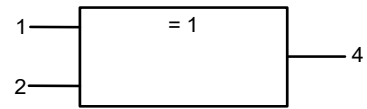


Figure 8-2 IEC logic symbol

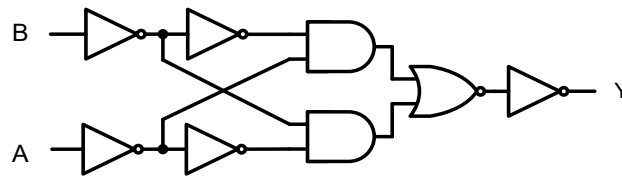


Figure 8-3 Logic diagram

### 8.3 Function Table

INPUT		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

**Note:** H=HIGH voltage level; L=LOW voltage level

8.4 Testing Circuit

8.4.1 AC Testing Circuit

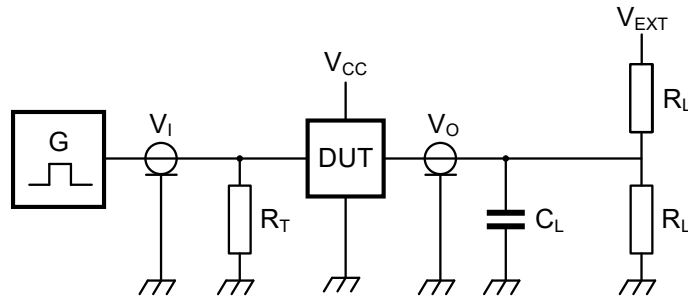


Figure 8-4 Test circuit for measuring switching times

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.

$V_{EXT}$ =External voltage for measuring switching times.

8.4.2 AC Testing Waveforms

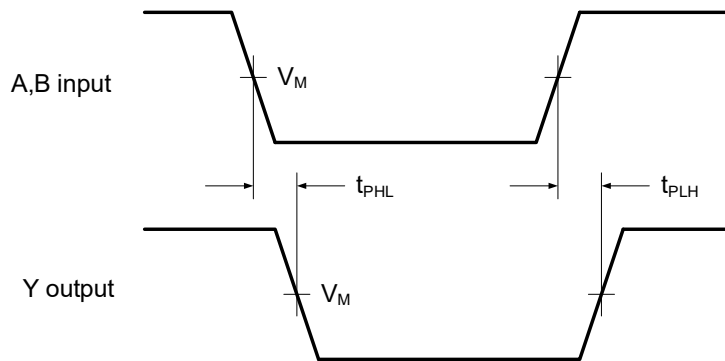


Figure 8-5 The input A, B to output Y propagation delays

**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	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

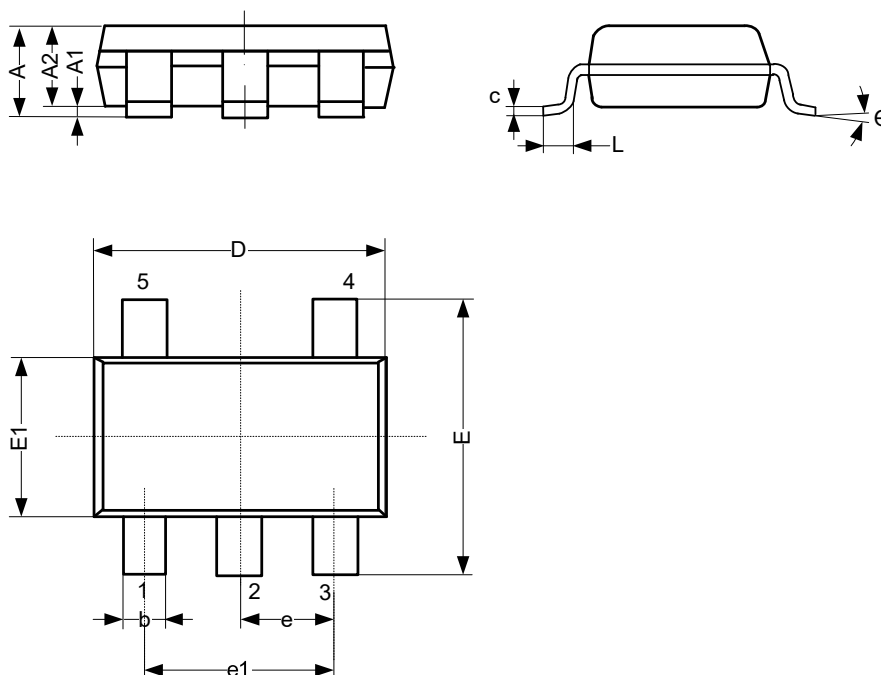
**8.4.4 Test Data**

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 $\Omega$	Open
2.3V to 2.7V	$V_{CC}$	$\leq 3ns$	30pF	500 $\Omega$	Open
2.7V	2.7V	$\leq 3ns$	50pF	500 $\Omega$	Open
3.0V to 3.6V	2.7V	$\leq 3ns$	50pF	500 $\Omega$	Open
4.5V to 5.5V	$V_{CC}$	$\leq 3ns$	50pF	500 $\Omega$	Open

9 Mechanical Information

9.1 SOT-23-5L Mechanical Information

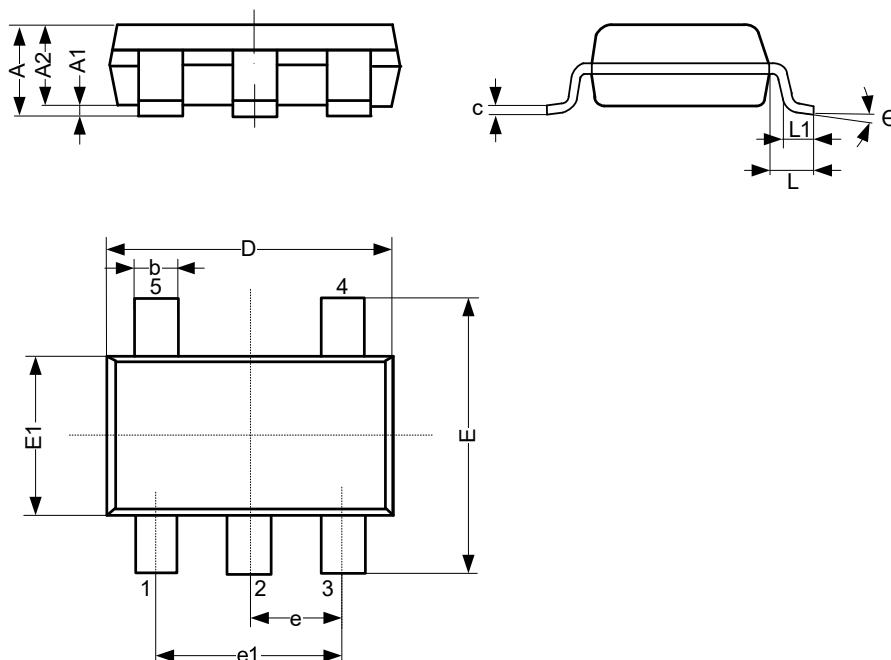
9.1.1 SOT-23-5L Outline Dimensions



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	1.15	-	1.35
E1	2.15	-	2.45
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.

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