

Single 2-input NAND Gate (Open-drain)

CJ74LVC1G38 Logic

1 Introduction

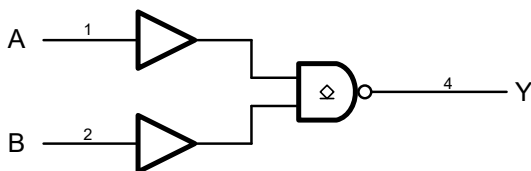
The CJ74LVC1G38 provides a 2-input NAND function.

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

2 Available Packages

PART NUMBER	PACKAGE
CJ74LVC1G38	SOT-23-5L
	SOT-353

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



Logic diagram

3 Features

- Wide supply voltage range from 1.65V to 5.5V
- 5V tolerant outputs for interfacing with 5V logic
- $\pm 24\text{mA}$ output drive ($V_{CC}=3.0\text{V}$)
- CMOS low power consumption
- Open drain outputs
- Specified from -40°C to $+125^{\circ}\text{C}$

4 Applications

- AV receivers
- Blu-ray players and home theaters
- DVD recorders and players
- Desktop or notebook PCs
- Digital radio or internet radio players
- Digital video cameras (DVC)
- Embedded PCs
- GPS: personal navigation devices
- Mobile internet devices
- Network projector front-ends
- Portable media players
- Pro audio mixers
- Smoke detectors
- Solid dtate drive (SSD): enterprise
- High-definition (HDTV)
- Tablets: enterprise
- Audio docks: portable
- DLP front projection systems
- DVR and DVS
- Digital picture frame (DPF)
- Digital still cameras

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74LVC1G38M5N	SOT-23-5L	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74LVC1G38R5N	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

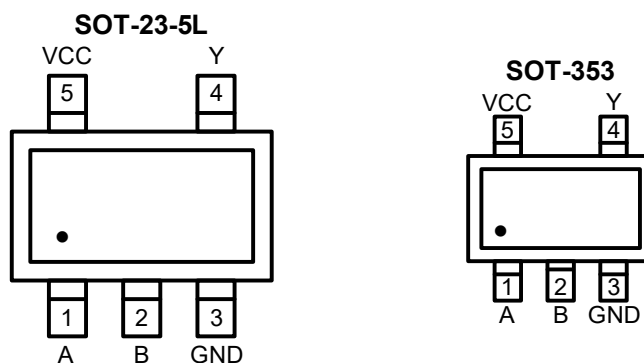


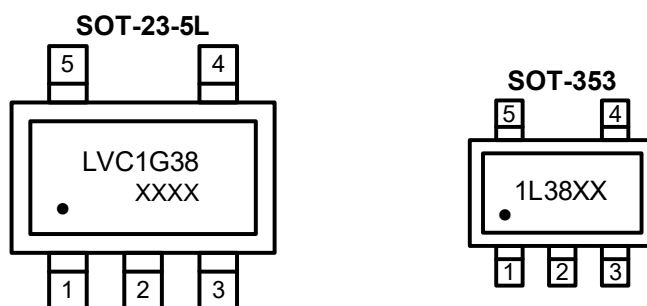
Figure 6-1 Pin configuration

6.2 Pin Function

PIN		I/O ⁽¹⁾	DESCRIPTION
No.	NAME		
1	A	I	Data input
2	B	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	+6.5	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 $V_O < 0V$	-	± 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	-	-	300	mW
T_L	Soldering temperature	10s	-	260	°C

Note: When $V_{CC}=0V$ (Power-down mode), the output voltage can be 5.5V in normal operation.

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	-	5.5	V
		Disable mode; $V_{CC}=1.65V$ to $5.5V$	0	-	5.5	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_{IH}	HIGH-level input voltage	$V_{CC}=1.65\text{V}$ to 1.95V		$0.65 \times V_{CC}$	-	-	V
		$V_{CC}=2.3\text{V}$ to 2.7V		1.7	-	-	V
		$V_{CC}=2.7\text{V}$ to 3.6V		2.0	-	-	V
		$V_{CC}=4.5\text{V}$ to 5.5V		$0.7 \times V_{CC}$	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC}=1.65\text{V}$ to 1.95V		-	-	$0.35 \times V_{CC}$	V
		$V_{CC}=2.3\text{V}$ to 2.7V		-	-	0.7	V
		$V_{CC}=2.7\text{V}$ to 3.6V		-	-	0.8	V
		$V_{CC}=4.5\text{V}$ to 5.5V		-	-	$0.3 \times V_{CC}$	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 5.5V	-	-	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 5.5V		-	-	± 1	μA
I_{OZ}	OFF-state output current	$V_I=V_{IH}$ or V_{IL} ; $V_O=V_{CC}$ or GND; $V_{CC}=5.5\text{V}$		-	-	± 2	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 5.5V		-	-	4	μA
ΔI_{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 5.5V		-	-	500	μA
C_i	Input capacitance	-		-	2.5	-	pF

Note: All typical values are measured at $V_{CC}=3.3\text{V}$ 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_{IH}	HIGH-level input voltage	$V_{CC}=1.65\text{V}$ to 1.95V		$0.65 \times V_{CC}$	-	-	V
		$V_{CC}=2.3\text{V}$ to 2.7V		1.7	-	-	V
		$V_{CC}=2.7\text{V}$ to 3.6V		2.0	-	-	V
		$V_{CC}=4.5\text{V}$ to 5.5V		$0.7 \times V_{CC}$	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC}=1.65\text{V}$ to 1.95V		-	-	$0.35 \times V_{CC}$	V
		$V_{CC}=2.3\text{V}$ to 2.7V		-	-	0.7	V
		$V_{CC}=2.7\text{V}$ to 3.6V		-	-	0.8	V
		$V_{CC}=4.5\text{V}$ to 5.5V		-	-	$0.3 \times V_{CC}$	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 5.5V	-	-	0.10	V

			$I_O=4\text{mA}; V_{CC}=1.65\text{V}$	-	-	0.70	V
			$I_O=8\text{mA}; V_{CC}=2.3\text{V}$	-	-	0.45	V
			$I_O=12\text{mA}; V_{CC}=2.7\text{V}$	-	-	0.60	V
			$I_O=24\text{mA}; V_{CC}=3.0\text{V}$	-	-	0.80	V
			$I_O=32\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.80	V
I_I	Input leakage current	$V_I=5.5\text{V}$ or GND; $V_{CC}=0\text{V}$ to 5.5V		-	-	± 1	μA
I_{OZ}	OFF-state output current	$V_I=V_{IH}$ or V_{IL} ; $V_O=V_{CC}$ or GND; $V_{CC}=5.5\text{V}$		-	-	± 2	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 5.5V		-	-	4	μA
ΔI_{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 5.5V		-	-	500	μA

7.4.3 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. ⁽¹⁾	MAX.	UNIT
t_{PHL}, t_{PLH}	A, B to Y propagation delay	See Figure 8-5	$V_{CC}=1.65\text{V}$ to 1.95V	-	10.5	15.8	ns
			$V_{CC}=2.3\text{V}$ to 2.7V	-	6.3	9.5	ns
			$V_{CC}=2.7\text{V}$	-	8.8	13.1	ns
			$V_{CC}=3.0\text{V}$ to 3.6V	-	8.1	12.1	ns
			$V_{CC}=4.5\text{V}$ to 5.5V	-	5.3	7.9	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 5.0V respectively.

7.4.4 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}, t_{PLH}	A, B to Y propagation delay	See Figure 8-5	$V_{CC}=1.65\text{V}$ to 1.95V	-	-	19.7	ns
			$V_{CC}=2.3\text{V}$ to 2.7V	-	-	11.8	ns
			$V_{CC}=2.7\text{V}$	-	-	17.1	ns
			$V_{CC}=3.0\text{V}$ to 3.6V	-	-	15.3	ns
			$V_{CC}=4.5\text{V}$ to 5.5V	-	-	9.9	ns

8 Detailed Description

8.1 Overview

The CJ74LVC1G38 provides a 2-input NAND function.

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

8.2 Functional Block Diagram

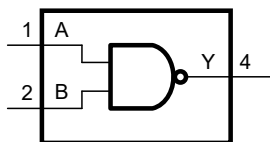


Figure 8-1 Logic symbol

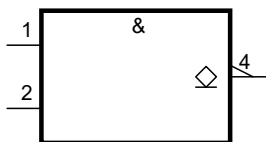


Figure 8-2 IEC logic symbol

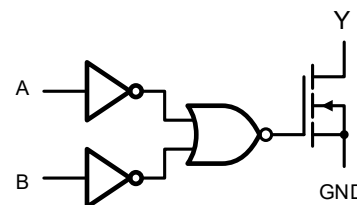


Figure 8-3 Logic diagram

8.3 Function Table⁽¹⁾

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

(1) H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high-impedance OFF-state.

8.4 Testing Circuit

8.4.1 AC Testing Circuit

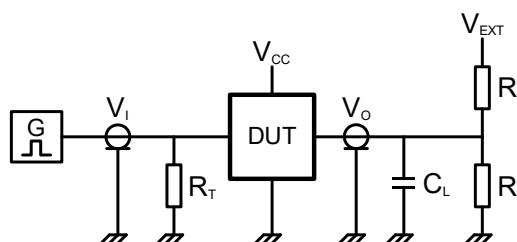


Figure 8-4 Test circuit for measuring switching times

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

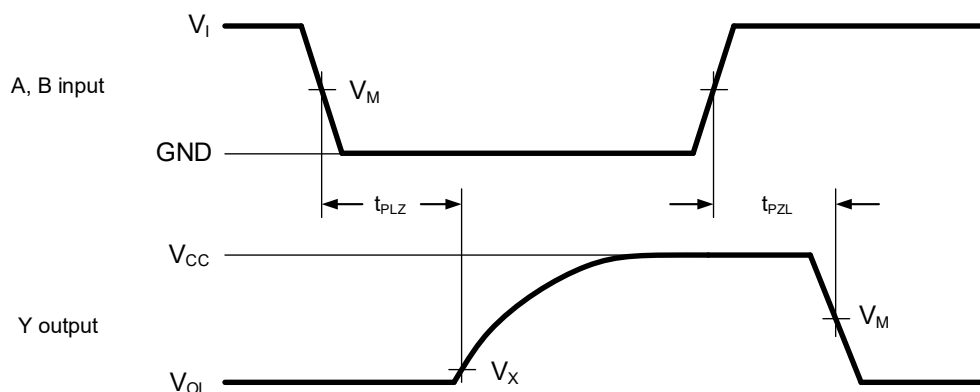


Figure 8-5 The input A, B to output Y propagation delays

8.4.3 Measurement Points

SUPPLY VOLTAGE	INPUT	OUTPUT	
V_{CC}	V_M	V_M	V_X
1.65V to 1.95V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.15V$
2.3V to 2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.15V$
2.7V	1.5V	1.5V	$V_{OL} + 0.3V$
3.0V to 3.6V	1.5V	1.5V	$V_{OL} + 0.3V$
4.5V to 5.5V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.3V$

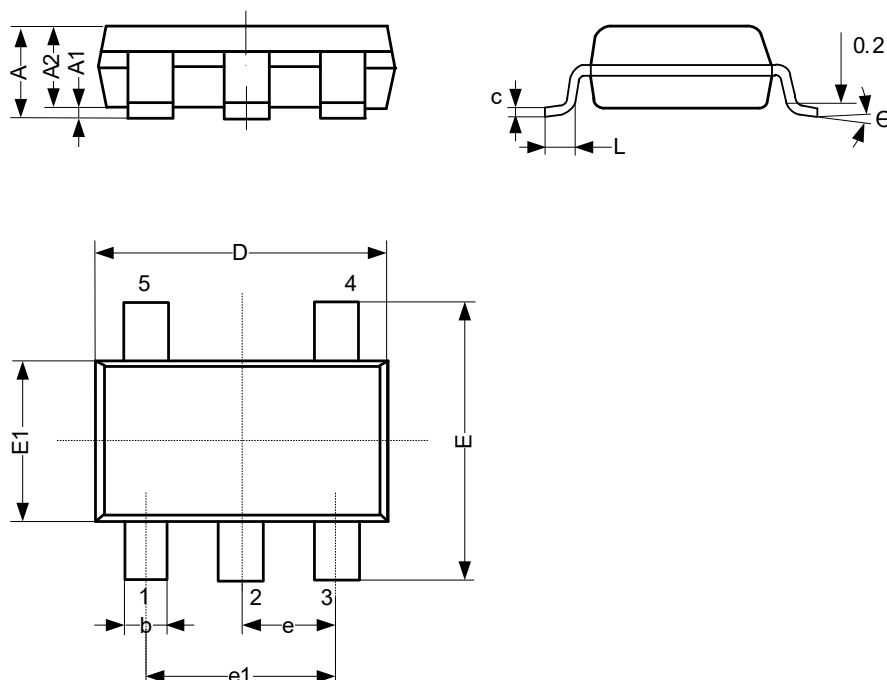
8.4.4 Test Data

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

9 Mechanical Information

9.1 SOT-23-5L Mechanical Information

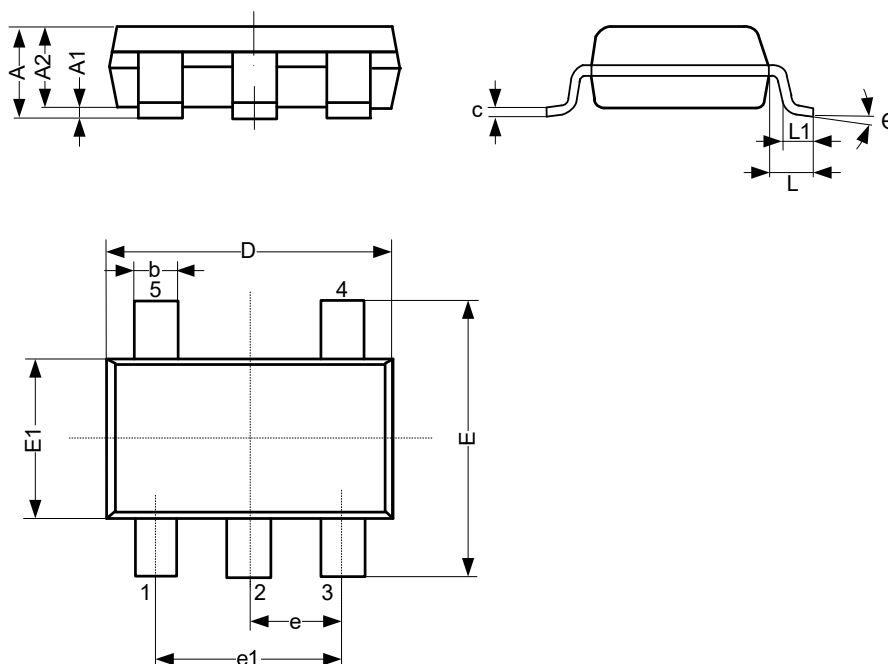
9.1.1 SOT-23-5L Outline Dimensions



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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