Single 3-input AND Gate

CJ74LVC1G11 Logic

1 Introduction

The CJ74LVC1G11 provides a single 3-input AND gate.

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.

2 Available Packages

PART NUMBER	PACKAGE
CJ74LVC1G11	SOT-23-6L
	SOT-363

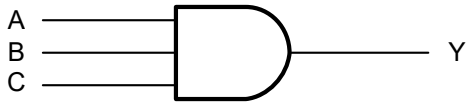
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Wide supply voltage range from 1.65V to 5.5V
- 5V tolerant inputs for interfacing with 5V logic
- ±24mA output drive (V_{CC}=3.0V)
- CMOS low power consumption
- Specified from -40°C to +125°C

4 Applications

- AV Receivers
- DLP Front Projection System
- Digital Picture Frames
- Digital Radio
- Digital Still Cameras
- Digital Video Cameras (DVC)
- Embedded PCs
- E-Books
- Ethernet Switches
- GPS: Personal Navigation Devices
- Handset: Smartphones
- High-Speed Data Acquisition and Generation



Logic diagram

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74LVC1G11M6N	SOT-23-6L	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74LVC1G11R6N	SOT-363	-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

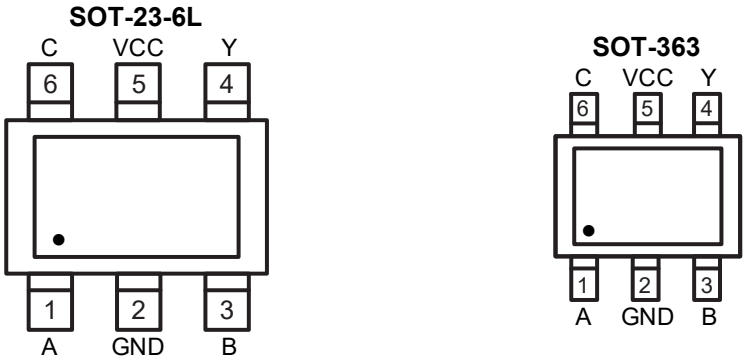


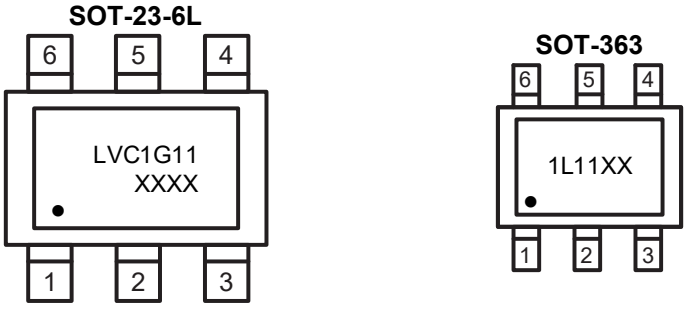
Figure 6-1 Pin configuration

6.2 Pin Function

PIN		I/O(1)	DESCRIPTION
No.	NAME		
1	A	I	Data input
2	GND	G	Ground (0V)
3	B	I	Data input
4	Y	O	Data output
5	VCC	P	Supply voltage
6	C	I	Data input

(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
I_{IK}	Input clamping current	V_I < 0V	-50	-	mA
V_I	Input voltage	-	-0.5	+6.5	V
I_{OK}	Output clamping current	V_O > V_{CC} or V_O < 0V	-	±50	mA
V_O	Output voltage	Active mode	-0.5	V_{CC}+0.5	V
		Power-down mode	-0.5	+6.5	V
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	-	-	250	mW
T_{stg}	Storage temperature	-	-65	+150	°C
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	-	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°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP. (1)	MAX.	UNIT
V_{IH}	HIGH-level input voltage	V_{CC}=1.65V to 1.95V		0.65xV_{CC}	-	-	V
		V_{CC}=2.3V to 2.7V		1.7	-	-	V
		V_{CC}=2.7V to 3.6V		2.0	-	-	V
		V_{CC}=4.5V to 5.5V		0.7xV_{CC}	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=1.65V to 1.95V		-	-	0.35xV_{CC}	V
		V_{CC}=2.3V to 2.7V		-	-	0.7	V
		V_{CC}=2.7V to 3.6V		-	-	0.8	V
		V_{CC}=4.5V to 5.5V		-	-	0.3xV_{CC}	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}	I_O=-100uA; V_{CC}=1.65V to 5.5V	V_{CC} - 0.1	-	-	V
			I_O=-4mA; V_{CC}=1.65V	1.2	1.54	-	V
			I_O=-8mA; V_{CC}=2.3V	1.9	2.15	-	V
			I_O=-12mA; V_{CC}=2.7V	2.2	2.50	-	V
			I_O=-24mA; V_{CC}=3.0V	2.3	2.62	-	V
			I_O=-32mA; V_{CC}=4.5V	3.8	4.11	-	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}	I_O=100uA; V_{CC}=1.65V to 5.5V	-	-	0.10	V
			I_O=4mA; V_{CC}=1.65V	-	0.07	0.45	V
			I_O=8mA; V_{CC}=2.3V	-	0.12	0.30	V
			I_O=12mA; V_{CC}=2.7V	-	0.17	0.40	V
			I_O=24mA; V_{CC}=3.0V	-	0.33	0.55	V
			I_O=32mA; V_{CC}=4.5V	-	0.39	0.55	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	Per pin; V_I=V_{CC}-0.6V; I_O=0A; V_{CC}=2.3V to 5.5V		-	-	500	uA
C_I	Input capacitance	V_{CC}=3.3V; V_I=GND to V_{CC}		-	4	-	pF

(1) All typical values are measured at T_{amb}=25°C.

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_{IH}	HIGH-level input voltage	V_{CC}=1.65V to 1.95V		0.65xV_{CC}	-	-	V
		V_{CC}=2.3V to 2.7V		1.7	-	-	V
		V_{CC}=2.7V to 3.6V		2.0	-	-	V
		V_{CC}=4.5V to 5.5V		0.7xV_{CC}	-	-	V
V_{IL}	LOW-level input voltage	V_{CC}=1.65V to 1.95V		-	-	0.35xV_{CC}	V
		V_{CC}=2.3V to 2.7V		-	-	0.7	V
		V_{CC}=2.7V to 3.6V		-	-	0.8	V
		V_{CC}=4.5V to 5.5V		-	-	0.3xV_{CC}	V
V_{OH}	HIGH-level output voltage	V_I = V_{IH} or V_{IL}	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_{IH} or V_{IL}	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	Per pin; 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.(1)	MAX.	UNIT
t_{PHL}	A, B and C to Y propagation delay	See Figure 8-5	V_{CC}=1.65V to 1.95V	-	12.5	18.8	ns
			V_{CC}=2.3V to 2.7V	-	10.5	15.8	ns
			V_{CC}=2.7V	-	10	15	ns
			V_{CC}=3.0V to 3.6V	-	9.5	14.3	ns
			V_{CC}=4.5V to 5.5V	-	9	13.5	ns
t_{PLH}	A, B and C to Y propagation delay	See Figure 8-5	V_{CC}=1.65V to 1.95V	-	14	21	ns
			V_{CC}=2.3V to 2.7V	-	10	15	ns
			V_{CC}=2.7V	-	9.5	14.3	ns
			V_{CC}=3.0V to 3.6V	-	8.5	12.8	ns
			V_{CC}=4.5V to 5.5V	-	7.5	11.3	ns

(1) Typical values are measured at T_{amb}=25°C and V_{CC}=1.8V, 2.5V, 2.7V, 3.3V and 5.0V 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_{PHL}	A, B and C to Y propagation delay	See Figure 8-5	V_{CC}=1.65V to 1.95V	-	-	20.8	ns
			V_{CC}=2.3V to 2.7V	-	-	17.8	ns
			V_{CC}=2.7V	-	-	17	ns
			V_{CC}=3.0V to 3.6V	-	-	16.3	ns
			V_{CC}=4.5V to 5.5V	-	-	15.5	ns
t_{PLH}	A, B and C to Y propagation delay	See Figure 8-5	V_{CC}=1.65V to 1.95V	-	-	23	ns
			V_{CC}=2.3V to 2.7V	-	-	17	ns
			V_{CC}=2.7V	-	-	16.3	ns
			V_{CC}=3.0V to 3.6V	-	-	14.8	ns
			V_{CC}=4.5V to 5.5V	-	-	13.3	ns

8 Detailed Description

8.1 Overview

The CJ74LVC1G11 provides a single 3-input AND gate.

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.

8.2 Functional Block Diagram

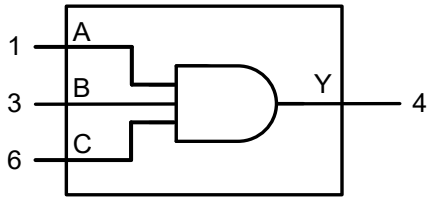


Figure 8-1 Logic symbol

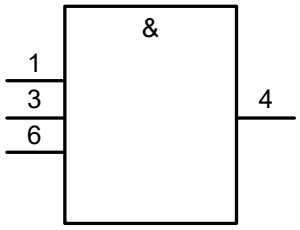


Figure 8-2 IEC logic symbol

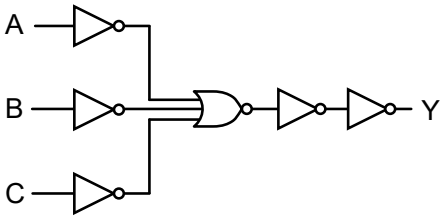


Figure 8-3 Logic diagram

8.3 Function Table(1)

INPUT			OUTPUT
A	**B**	**C**	**Y**
H	H	H	H
L	X	X	L
X	L	X	L
X	X	L	L

(1) H=HIGH voltage level; L=LOW voltage level; X=don't care.

8.4 Testing Circuit

8.4.1 AC Testing Circuit

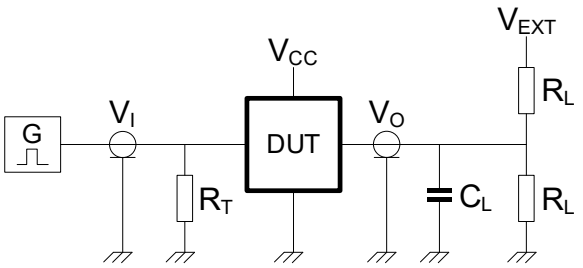


Figure 8-4 Test circuit for measuring switching times

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

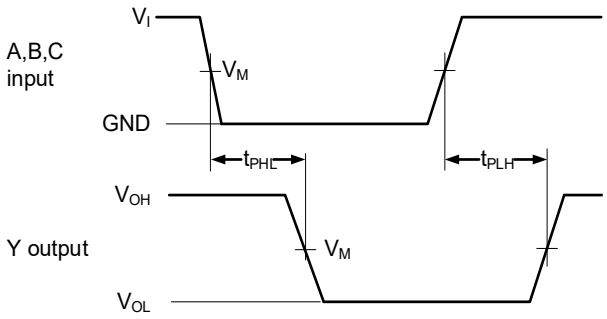


Figure 8-5 The input A, B and C to output Y propagation delays

8.4.3 Measurement Points

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

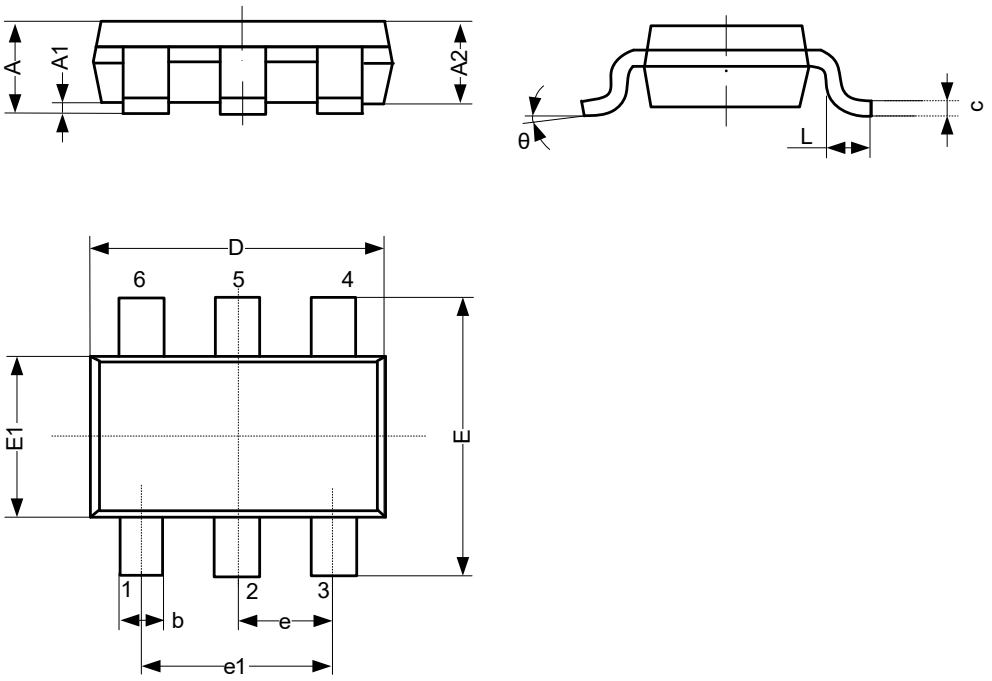
8.4.4 Test Data

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}	≤ 3ns	30pF	1kΩ	Open
2.3V to 2.7V	V_{CC}	≤ 3ns	30pF	500Ω	Open
2.7V	2.7V	≤ 3ns	50pF	500Ω	Open
3.0V to 3.6V	2.7V	≤ 3ns	50pF	500Ω	Open
4.5V to 5.5V	V_{CC}	≤ 3ns	50pF	500Ω	Open

9 Mechanical Information

9.1 SOT-23-6L Mechanical Information

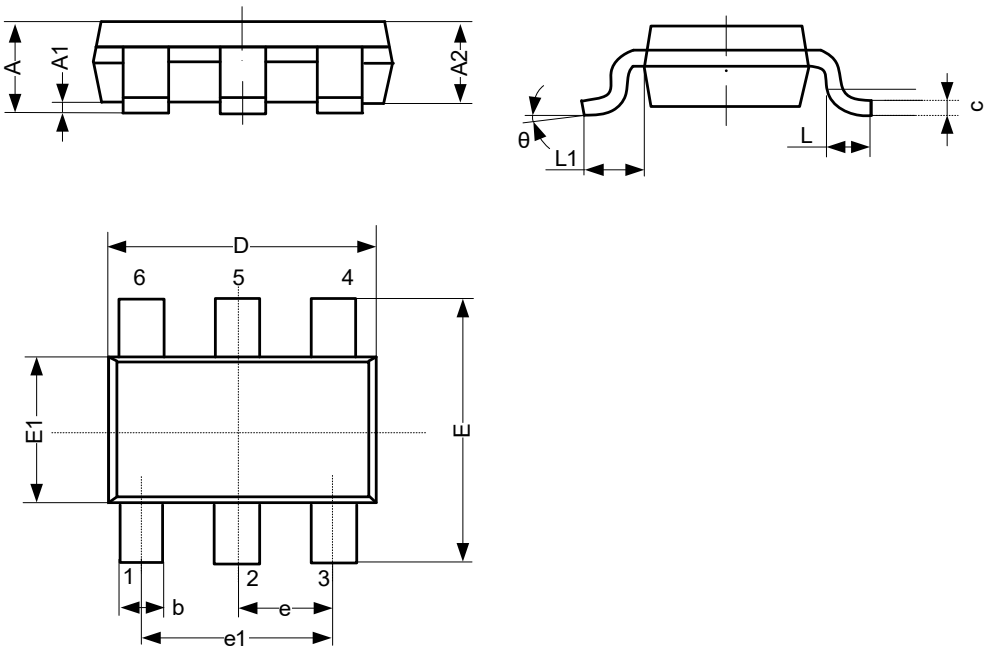
9.1.1 SOT-23-6L Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.25
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-363 Mechanical Information

9.2.1 SOT-363 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	0.26	-	0.46
L1	-	0.525	-
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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