

SINGLE BILATRAL ANALOG SWITCH

1. Description

The **FLH 74LVC1G66** is a high-speed CMOS device. The device has two data input/output pins (A and B) and an active HIGH enable input pin(C). The device can handle both analog and digital signals.

The signals can be transmitted in either direction when enable pin is high. The analog switch is off when enable pin is low.

2. Features

- Operation Voltage Range: 1.65~5.5V
- Inputs Accept Voltages to 5.5V
- Max T_{PD} of 0.8 ns at 3.3V
- High Degree of Linearity

3. Applications

- Wireless Devices
- Audio and Video Signal Routing
- Portable Computing
- Wearable Devices
- Signal Gating, Chopping, Modulation or Demodulation (Modem)
- Signal Multiplexing for Analog-to-Digital and Digital-to-Analog Conversion Systems.

4. Pin Configuration

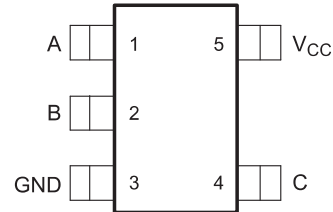


Fig. 1. Pinning Assignments

PIN		I/O	DESCRIPTION
NAME	NO.		
A	1	I/O	Bidirectional signal to be switched
B	2	I/O	Bidirectional signal to be switched
C	4	I	Controls the switch (L = OFF, H = ON)
GND	3	—	Ground pin
NC	—	—	Do not connect
V _{CC}	5	—	Power pin

5. LOGIC DIAGRAM

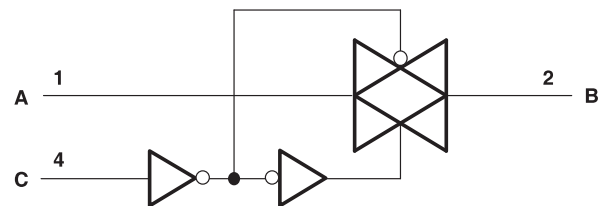


Fig. 2. Logic Diagram (Positive Logic)

6. Ordering Information

Type Number	Package Type	Packing
74LVC1G66DBV	SOT-23-5L	Tape & Reel
74LVC1G66DRL	SOT-353	Tape & Reel
74LVC1G66DCK	SC-70	Tape & Reel

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.

7. ABSOLUTE MAXIMUM RATING

($T_A = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage (Note2)	V_{CC}	-0.5 ~ 6.5	V
Input Voltage	V_{IN}	-0.5 ~ 6.5	V
Switch I/O voltage range	$V_{I/O}$	-0.5 ~ $V_{CC}+0.5$	V
Control Input Clamp Current ($V_{IN}<0$)	I_{IK}	-50	mA
I/O Port Diode Current ($V_{I/O}<0$ or $V_{I/O}>V_{CC}$)	I_{IOK}	± 50	mA
On-state Switch Current ($V_{I/O}$: 0 to V_{CC})	I_T	± 50	mA
V_{CC} or GND Current	I_{CC}	± 100	mA
Storage Temperature	T_{STG}	-65 ~ +150	$^\circ\text{C}$

Notes:

- The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
- Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

8. RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		1.65		5.5	V
Input Voltage	V_{IN}		0		5.5	V
I/O Port Voltage	$V_{I/O}$		0		V_{CC}	V
Operating Temperature	T_A		-40		85	$^\circ\text{C}$

9. STATIC CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
High-level Input Voltage	V_{IH}	$V_{CC}=1.65\text{V}\sim 1.95\text{V}$	$0.65\times V_{CC}$			V	
		$V_{CC}=2.3\text{V}\sim 2.7\text{V}$	1.7			V	
		$V_{CC}=3\text{V}\sim 3.6\text{V}$	2			V	
		$V_{CC}=4.5\text{V}\sim 5.5\text{V}$	$0.7\times V_{CC}$			V	
Low-level Input Voltage	V_{IL}	$V_{CC}=1.65\text{V}\sim 1.95\text{V}$			$0.35\times V_{CC}$	V	
		$V_{CC}=2.3\text{V}\sim 2.7\text{V}$			0.7	V	
		$V_{CC}=3\text{V}\sim 3.6\text{V}$			0.8	V	
		$V_{CC}=4.5\text{V}\sim 5.5\text{V}$			$0.3\times V_{CC}$	V	
Input transition rise/fall time	$\Delta t/\Delta v$	$V_{CC}=1.65\text{V}\sim 1.95\text{V}$			20	ns	
		$V_{CC}=2.3\text{V}\sim 2.7\text{V}$			20		
		$V_{CC}=3\text{V}\sim 3.6\text{V}$			10		
		$V_{CC}=4.5\text{V}\sim 5.5\text{V}$			10		
ON-resistance(rail)	$R_{ON(rail)}$	$V_I = \text{GND or } V_{CC}$	$V_{CC}=1.65\text{V}, I_S=4\text{mA}$		12	30	Ω
			$V_{CC}=2.3\text{V}, I_S=8\text{mA}$		9	20	
			$V_{CC}=3\text{V}, I_S=24\text{mA}$		7.5	15	
			$V_{CC}=4.5\text{V}, I_S=32\text{mA}$		5.5	10	

ON-resistance(peak)	$R_{ON(peak)}$	$V_I = GND \text{ or } V_{CC}$	$V_{CC}=1.65V, I_S=4mA$	74.5	120	Ω
			$V_{CC}=2.3V, I_S=8mA$	20	30	
			$V_{CC}=3V, I_S=24mA$	11.5	20	
			$V_{CC}=4.5V, I_S=32mA$	7.5	15	
On-state Switch Leakage Current	$I_{S(ON)}$	$V_I = V_{CC} \text{ or } GND, V_C = V_{IH}, V_O = \text{Open}, V_{CC}=5.5V$			± 0.1	μA
Off-state Switch Leakage Current	$I_{S(off)}$	$V_I = V_{CC} \text{ and } V_O = GND \text{ or } V_I = GND \text{ and } V_O = V_{CC}, V_C = V_{IL}, V_{CC}=5.5V$			± 0.1	μA
Control input current	$I_{I(CTL)}$	$V_C = V_{CC} \text{ or } GND, V_{CC}=5.5V$			± 0.1	μA
Quiescent Supply Current	I_{CC}	$V_C = V_{CC} \text{ or } GND, V_{CC}=5.5V$			1	μA
Additional Quiescent Supply Current	ΔI_{CC}	$V_C = V_{CC} - 0.6V, V_{CC}=5.5V$			500	μA
Cic Control input capacitance	C_{IC}	$V_{CC}=5V$		2		pF
Cio(off) Switch input/output capacitance	C_{OFF}	$V_{CC}=5V$		6		pF
Cio(on) Switch input/output capacitance	C_{ON}	$V_{CC}=5V$		13		pF

10. ANALOG SWITCH CHARACTERISTICS

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	TYP	UNIT	
Frequency response(1) (switch ON)	A or B	B or A	$C_L=50pF, R_L=600\Omega,$ $F_{IN}=\text{sine wave}$	$V_{CC}=1.65V$	35	MHz
				$V_{CC}=2.3$	120	
				$V_{CC}=3V$	175	
				$V_{CC}=4.5V$	195	
			$C_L=5pF, R_L=50\Omega,$ $F_{IN} = \text{sine wave}$	$V_{CC}=1.65V$	>300	
				$V_{CC}=2.3V$	>300	
				$V_{CC}=3V$	>300	
				$V_{CC}=4.5V$	>300	
Crosstalk (control input to signal output)	C	A or B	$C_L=50pF, R_L=600\Omega,$ $F_{IN}=1MHz(\text{square wave})$	$V_{CC}=1.65V$	35	mV
				$V_{CC}=2.3V$	50	
				$V_{CC}=3V$	70	
				$V_{CC}=4.5V$	100	
Feedthrough attenuation(2) (switch OFF)	A or B	B or A	$C_L=50pF, R_L = 600\Omega,$ $F_{IN} = 1MHz(\text{sine wave})$	$V_{CC}=1.65V$	-58	dB
				$V_{CC}=2.3V$	-58	
				$V_{CC}=3V$	-58	
				$V_{CC}=4.5V$	-58	
			$C_L=5pF, R_L = 50\Omega,$ $F_{IN} = 1MHz(\text{sine wave})$	$V_{CC}=1.65V$	-42	
				$V_{CC}=2.3V$	-42	
			$V_{CC}=3V$	-42		

				V _{CC} =4.5V	-42	
Sine-wave distortion	A or B	B or A	C _L =50pF, R _L =10KΩ, F _{IN} =1KHZ(sine wave)	V _{CC} =1.65V	0.1	%
				V _{CC} =2.3V	0.025	
				V _{CC} =3V	0.015	
				V _{CC} =4.5V	0.01	
			C _L =50pF, R =10kΩ, F _{IN} =10KHZ(sine wave)	V _{CC} =1.65V	0.15	
				V _{CC} =2.3V	0.025	
				V _{CC} =3V	0.015	
				V _{CC} =4.5V	0.01	

Notes:

1. Adjust f_{IN} voltage to obtain 0 dBm at output. Increase f_{IN} frequency until dB meter reads -3dB.
2. Adjust f_{IN} voltage to obtain 0 dBm at input.

11. DYNAMIC CHARACTERISTICS

PARAMETER	SYMBOL	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	MAX	UNIT
Propagation delay time	t _{PD} (1)	A or B	B or A	V _{CC} =1.8V±0.15V		2	ns
				V _{CC} =2.5V±0.2V		1.2	
				V _{CC} =3.3V±0.3V		0.8	
				V _{CC} =5V±0.5V		0.6	
Tun-ON time	t _{EN} (2)	C	A or B	V _{CC} =1.8V±0.15V	2.5	12	ns
				V _{CC} =2.5V±0.2V	1.9	6.5	
				V _{CC} =3.3V±0.3V	1.8	5	
				V _{CC} =5V±0.5V	1.5	4.2	
Tun-OFF time	t _{DIS} (3)	C	A or B	V _{CC} =1.8V±0.15V	2.2	10	ns
				V _{CC} =2.5V±0.2V	1.4	6.9	
				V _{CC} =3.3V±0.3V	2	6.5	
				V _{CC} =5V±0.5V	1.4	5	

Notes:

t_{PLH} and t_{PHL} are the same as t_{PD}.

t_{PZL} and t_{PZH} are the same as t_{EN}.

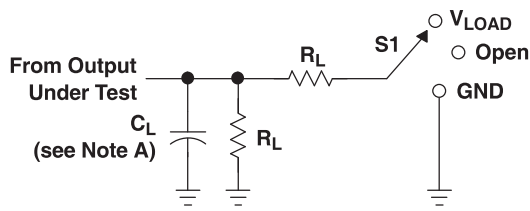
t_{PLZ} and t_{PHZ} are the same as t_{DIS}.

12. Operating Characteristics

(T_A =25°C, unless otherwise specified)

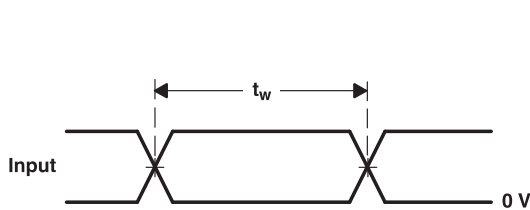
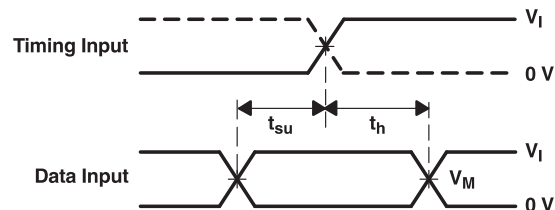
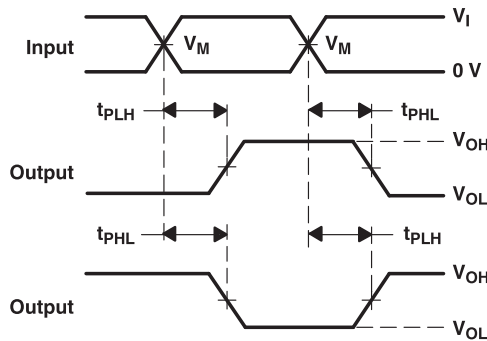
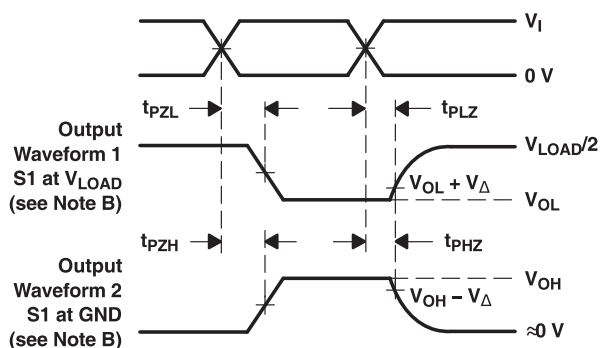
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C _{PD}	V _{CC} =3.3V, f=10MHz		9		pF

13. Load Circuit and Voltage Waveforms


LOAD CIRCUIT

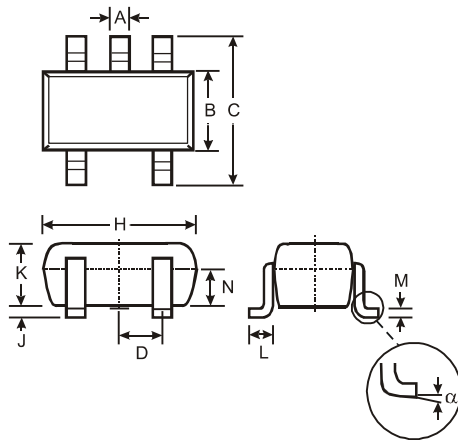
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_i	t_r/t_f					
$1.8\text{ V} \pm 0.15\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1k Ω	0.15V
$2.5\text{ V} \pm 0.2\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
$3.3\text{ V} \pm 0.3\text{ V}$	V_{CC}	$\leq 2.5\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 Ω	0.3V
$5\text{ V} \pm 0.5\text{ V}$	V_{CC}	$\leq 2.5\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 Ω	0.3V

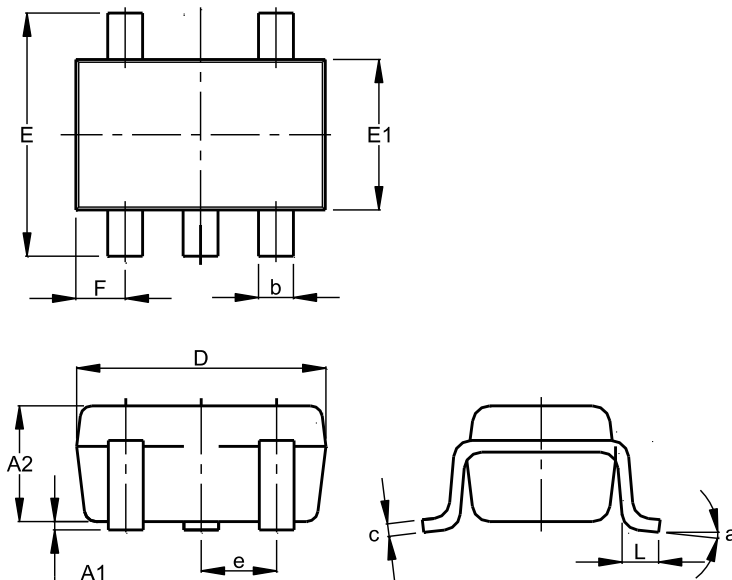

**VOLTAGE WAVEFORMS
PULSE DURATION**

**VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES**

**VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS**

**VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING**
NOTES:

- C_L includes probe and jig capacitance.
- Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- All input pulses are supplied by generators having the following characteristics: PRR $\leq 10\text{ MHz}$, $Z_0 = 50\ \Omega$.
- The outputs are measured one at a time, with one transition per measurement.
- t_{PLZ} and t_{PHZ} are the same as t_{dis} .
- t_{PZL} and t_{PZH} are the same as t_{en} .
- t_{PLH} and t_{PHL} are the same as t_{pd} .
- All parameters and waveforms are not applicable to all devices.

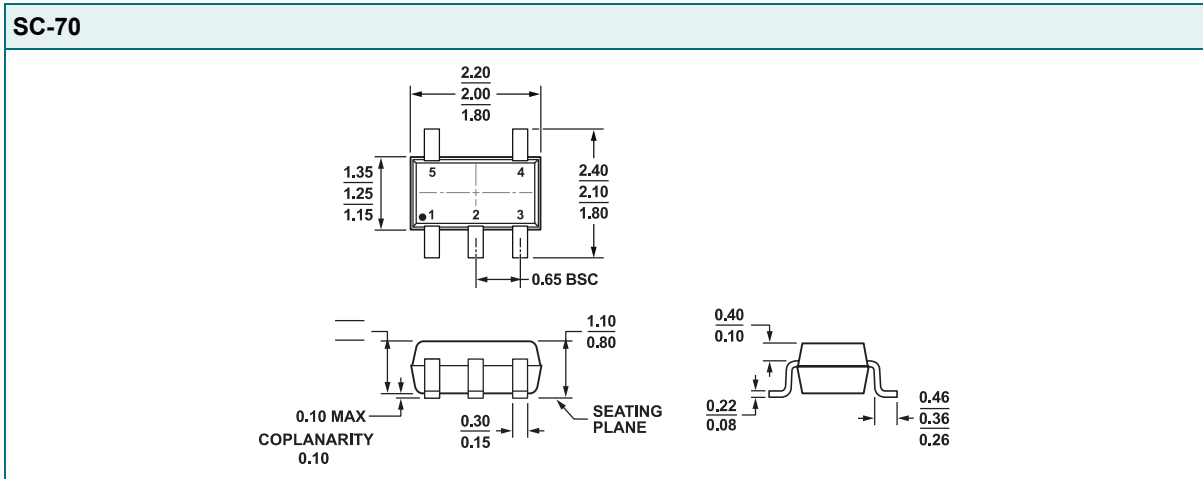
14. Package Outlines

SOT-23-5


SOT-23-5			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

SOT-353


SOT353			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

SC-70


15. Disclaimers

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