



# U74LVC1G66

**CMOS IC**

## SINGLE BILATRAL ANALOG SWITCH

### DESCRIPTION

The **U74LVC1G66** is a high-speed CMOS device.

The **U74LVC1G66** has two data input/output pins(A and B) and an active HIGH enable input pin(C) .

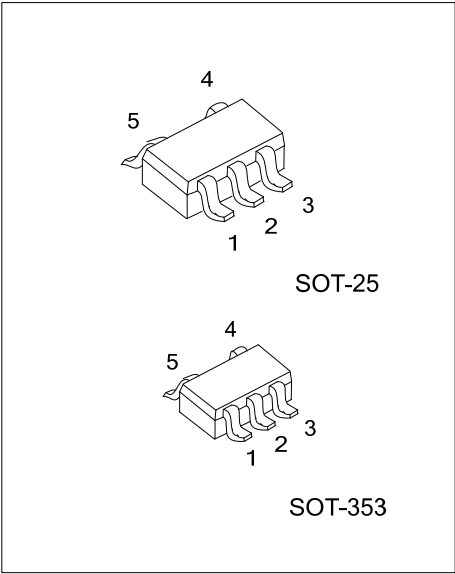
The **U74LVC1G66** can handle both analog and digital signals. The signals can be transmitted in either direction when enable pin is high . The analog switch is off when enable pin is low.

### FEATURES

- \* Operation Voltage Range: 1.65~5.5V
- \* Low Power Dissipation:  $I_{CC}=10\mu A(\text{Max})$
- \* Inputs Accept Voltages to 5.5V
- \* Max Tpd of 0.8 ns at 3.3V
- \* High Degree of Linearity

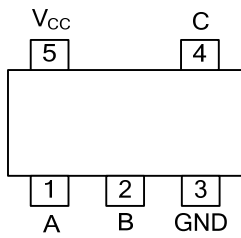
### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G66L-AF5-R	U74LVC1G66G-AF5-R	SOT-25	Tape Reel
U74LVC1G66L-AL5-R	U74LVC1G66G-AL5-R	SOT-353	Tape Reel



<p>U74LVC1G66L-AF5-R</p>	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) AF5: SOT-25, AL5: SOT-353
	(3)Lead Plating	(3) G: Halogen Free, L: Lead Free

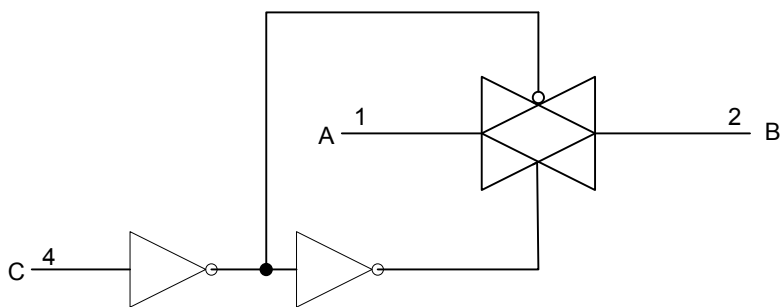
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

CONTROL INPUT(C)	SWITCH
L	OFF
H	ON

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING (T<sub>A</sub> =25°C , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage(Note2)	V <sub>CC</sub>	-0.5~6.5	V
Input Voltage	V <sub>IN</sub>	-0.5~6.5	V
Switch I/O voltage range	V <sub>I/O</sub>	-0.5~V <sub>CC</sub> +0.5	V
Control Input Clamp Current(V <sub>IN</sub> <0)	I <sub>IK</sub>	-50	mA
I/O Port Diode Current(V <sub>I/O</sub> <0 or V <sub>I/O</sub> >V <sub>CC</sub> )	I <sub>IOK</sub>	±50	mA
On-state Switch Current(V <sub>I/O</sub> : 0 to V <sub>CC</sub> )	I <sub>T</sub>	±50	mA
V <sub>CC</sub> or GND Current	I <sub>CC</sub>	±100	mA
Storage Temperature	T <sub>STG</sub>	-65 ~ +150	°C

Note 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

2. 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.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>		1.65		5.5	V
Input Voltage	V <sub>IN</sub>		0		5.5	V
I/O Port Voltage	V <sub>I/O</sub>		0		V <sub>CC</sub>	V
Operating Temperature	T <sub>A</sub>		-40		85	°C

■ STATIC CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-level Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> =1.65V~1.95V	0.65*V <sub>CC</sub>			V
		V <sub>CC</sub> =2.3V~2.7V	1.7			V
		V <sub>CC</sub> =3V~3.6V	2			V
		V <sub>CC</sub> =4.5V~5.5V	0.7*V <sub>CC</sub>			V
Low-level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =1.65V~1.95V			0.35*V <sub>CC</sub>	V
		V <sub>CC</sub> =2.3V~2.7V			0.7	V
		V <sub>CC</sub> =3V~3.6V			0.8	V
		V <sub>CC</sub> =4.5V~5.5V			0.3*V <sub>CC</sub>	V
Input transition rise/fall time	Δt/Δv	V <sub>CC</sub> =1.65V~1.95V			20	ns
		V <sub>CC</sub> =2.3V~2.7V			20	
		V <sub>CC</sub> =3V~3.6V			10	
		V <sub>CC</sub> =4.5V~5.5V			10	

### ■ STATIC CHARACTERISTICS(Cont.) (T<sub>A</sub> =25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
ON-resistance(rail)	R <sub>ON(rail)</sub>	V <sub>I</sub> =GND or V <sub>CC</sub>	V <sub>CC</sub> =1.65V, I <sub>S</sub> =4mA		12	30	Ω
			V <sub>CC</sub> =2.3V, I <sub>S</sub> =8mA		9	20	
			V <sub>CC</sub> =3V, I <sub>S</sub> =24mA		7.5	15	
			V <sub>CC</sub> =4.5V, I <sub>S</sub> =32mA		5.5	10	
ON-resistance(peak)	R <sub>ON(peak)</sub>	V <sub>I</sub> =GND or V <sub>CC</sub>	V <sub>CC</sub> =1.65V, I <sub>S</sub> =4mA		74.5	120	Ω
			V <sub>CC</sub> =2.3V, I <sub>S</sub> =8mA		20	30	
			V <sub>CC</sub> =3V, I <sub>S</sub> =24mA		11.5	20	
			V <sub>CC</sub> =4.5V, I <sub>S</sub> =32mA		7.5	15	
On-state Switch Leakage Current	I <sub>S</sub> (ON)	V <sub>I</sub> = V <sub>CC</sub> or GND, V <sub>C</sub> =V <sub>IH</sub> , V <sub>O</sub> = Open, V <sub>CC</sub> =5.5V			±1	uA	
Off-state Switch Leakage Current	I <sub>S</sub> (off)	V <sub>I</sub> = V <sub>CC</sub> and V <sub>O</sub> = GND or V <sub>I</sub> = GND and V <sub>O</sub> = V <sub>CC</sub> , V <sub>C</sub> =V <sub>IL</sub> , V <sub>CC</sub> =5.5V			±1	uA	
Control input current	I <sub>I(CTL)</sub>	V <sub>C</sub> = V <sub>CC</sub> or GND, V <sub>CC</sub> =5.5V			±1	uA	
Quiescent Supply Current	I <sub>CC</sub>	V <sub>C</sub> = V <sub>CC</sub> or GND, V <sub>CC</sub> =5.5V			10	uA	
Additional Quiescent Supply Current	ΔI <sub>CC</sub>	V <sub>C</sub> = V <sub>CC</sub> -0.6V, V <sub>CC</sub> =5.5V			500	uA	
Cic Control input capacitance	C <sub>IC</sub>	V <sub>CC</sub> =5V		2		pF	
Cio(off) Switch input/output capacitance	C <sub>OFF</sub>	V <sub>CC</sub> =5V		6		pF	
Cio(on) Switch input/output capacitance	C <sub>ON</sub>	V <sub>CC</sub> =5V		13		pF	

### ■ ANALOG SWITCH CHARACTERISTICS

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	TYP	UNIT	
Frequency response(1) (switch ON)	A or B	B or A	C <sub>L</sub> =50pF, R <sub>L</sub> =600Ω, F <sub>IN</sub> =sine wave	V <sub>CC</sub> =1.65V	35	MHz
				V <sub>CC</sub> =2.3	120	
				V <sub>CC</sub> =3V	175	
				V <sub>CC</sub> =4.5V	195	
			C <sub>L</sub> =5pF, R <sub>L</sub> =50Ω, F <sub>IN</sub> =sine wave	V <sub>CC</sub> =1.65V	>300	
				V <sub>CC</sub> =2.3V	>300	
				V <sub>CC</sub> =3V	>300	
				V <sub>CC</sub> =4.5V	>300	
Crosstalk (control input to signal output)	C	A or B	C <sub>L</sub> =50pF, R <sub>L</sub> =600Ω, F <sub>IN</sub> =1MHZ(square wave)	V <sub>CC</sub> =1.65V	35	mV
				V <sub>CC</sub> =2.3V	50	
				V <sub>CC</sub> =3V	70	
				V <sub>CC</sub> =4.5V	100	
Feedthrough attenuation(2) (switch OFF)	A or B	B or A	C <sub>L</sub> =50pF, R <sub>L</sub> =600Ω, F <sub>IN</sub> =1MHZ(sine wave)	V <sub>CC</sub> =1.65V	-58	dB
				V <sub>CC</sub> =2.3V	-58	
				V <sub>CC</sub> =3V	-58	
				V <sub>CC</sub> =4.5V	-58	
			C <sub>L</sub> =5pF, R <sub>L</sub> =50Ω, F <sub>IN</sub> =1MHZ(sine wave)	V <sub>CC</sub> =1.65V	-42	
				V <sub>CC</sub> =2.3V	-42	
				V <sub>CC</sub> =3V	-42	
				V <sub>CC</sub> =4.5V	-42	

### ■ ANALOG SWITCH CHARACTERISTICS(Cont.)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	TYP	UNIT	
Sine-wave distortion	A or B	B or A	$C_L = 50\text{pF}$ , $R_L = 10\text{K}\Omega$ , $F_{IN} = 1\text{KHZ}$ (sine wave)	$V_{CC}=1.65\text{V}$	0.1	%
				$V_{CC}=2.3\text{V}$	0.025	
				$V_{CC}=3\text{V}$	0.015	
				$V_{CC}=4.5\text{V}$	0.01	
			$C_L = 50\text{pF}$ , $R_L = 10\text{k}\Omega$ , $F_{IN} = 10\text{KHZ}$ (sine wave)	$V_{CC}=1.65\text{V}$	0.15	
				$V_{CC}=2.3\text{V}$	0.025	
				$V_{CC}=3\text{V}$	0.015	
				$V_{CC}=4.5\text{V}$	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.

### ■ 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	$V_{CC}=1.8\text{V}\pm 0.15\text{V}$		2	ns
				$V_{CC}=2.5\text{V}\pm 0.2\text{V}$		1.2	
				$V_{CC}=3.3\text{V}\pm 0.3\text{V}$		0.8	
				$V_{CC}=5\text{V}\pm 0.5\text{V}$		0.6	
Tun-ON time	$t_{EN}(2)$	C	A or B	$V_{CC}=1.8\text{V}\pm 0.15\text{V}$	2.5	12	ns
				$V_{CC}=2.5\text{V}\pm 0.2\text{V}$	1.9	6.5	
				$V_{CC}=3.3\text{V}\pm 0.3\text{V}$	1.8	5	
				$V_{CC}=5\text{V}\pm 0.5\text{V}$	1.5	4.2	
Tun-OFF time	$t_{DIS}(3)$	C	A or B	$V_{CC}=1.8\text{V}\pm 0.15\text{V}$	2.2	10	ns
				$V_{CC}=2.5\text{V}\pm 0.2\text{V}$	1.4	6.9	
				$V_{CC}=3.3\text{V}\pm 0.3\text{V}$	2	6.5	
				$V_{CC}=5\text{V}\pm 0.5\text{V}$	1.4	5	

Notes: 1.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$ .

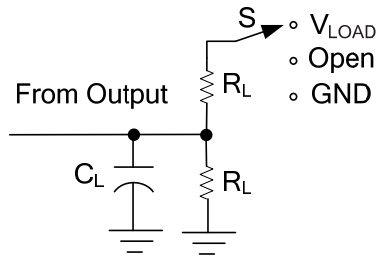
2.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{EN}$ .

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

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	$V_{CC}=3.3\text{V}$ , $f=10\text{MHz}$		9		pF

## TEST CIRCUIT AND WAVEFORMS

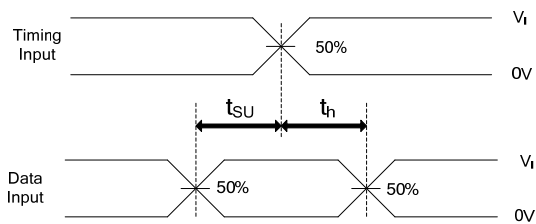


TEST CIRCUIT

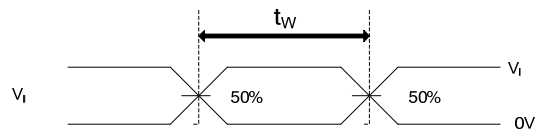
TEST	S
$T_{PLH}/T_{PHL}$	OPEN
$T_{PHZ}/T_{PZH}$	GND
$T_{PLZ}/T_{PZL}$	$V_{LOAD}$

Note:  $C_L$  includes probe and jig capacitance.

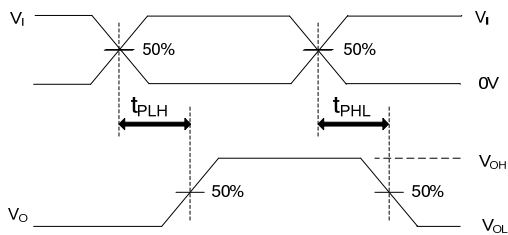
$V_{CC}$	$V_I$	$t_R, t_F$	$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
1.65V~1.95V	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1k $\Omega$	0.15V
2.3V~2.7V	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 $\Omega$	0.15V
3.0V~3.6V	$V_{CC}$	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 $\Omega$	0.3V
4.5V~5.5V	$V_{CC}$	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 $\Omega$	0.3V



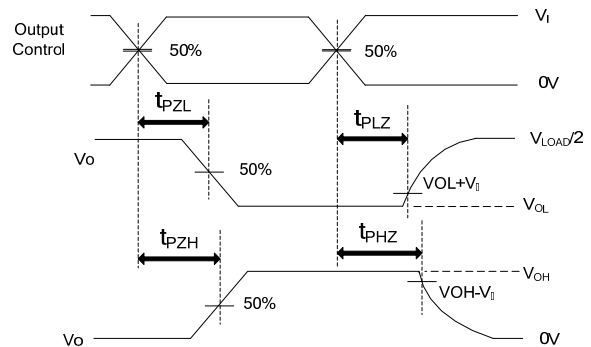
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

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