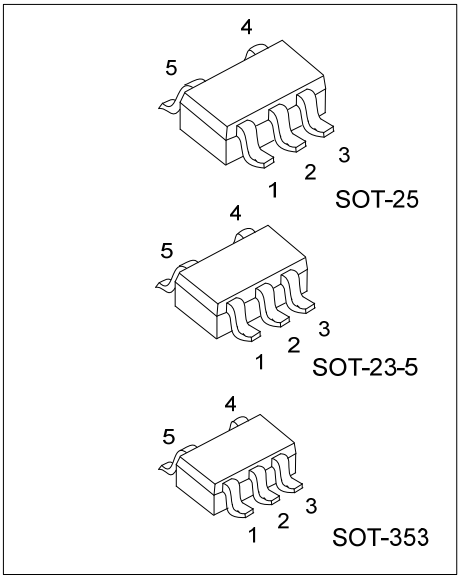
U74LVC1G66

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
* Inputs Accept Voltages to 5.5V
* Max t_{PD} of 0.8 ns at 3.3V
* High Degree of Linearity

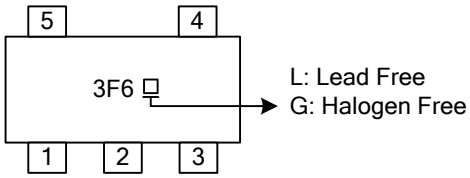
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G66L-AE5-R	U74LVC1G66G-AE5-R	SOT-23-5	Tape Reel
U74LVC1G66L-AF5-R	U74LVC1G66G-AF5-R	SOT-25	Tape Reel
U74LVC1G66L-AL5-R	U74LVC1G66G-AL5-R	SOT-353	Tape Reel

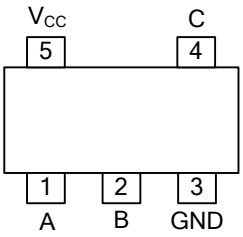
U74LVC1G66G-AE5-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



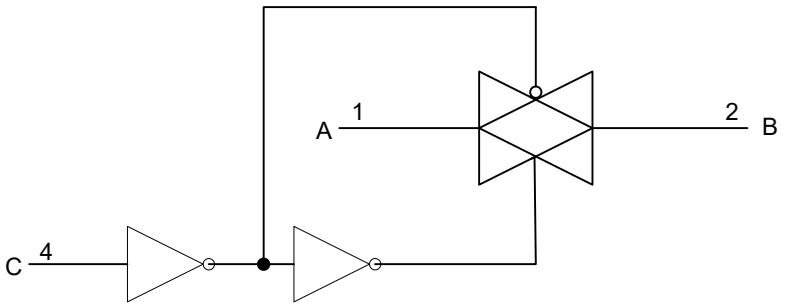
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

CONTROL INPUT(C)	SWITCH
L	OFF
H	ON

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING (T_A=25°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	°C

Notes: 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 COMDITIONS (T_A=25°C, unless otherwise specified)

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
Input Transition Rise/Fall Time	t_R / t_F	V_{CC}=1.65V~1.95V			20	ns
		V_{CC}=2.3V~2.7V			20	ns
		V_{CC}=3V~3.6V			10	ns
		V_{CC}=4.5V~5.5V			10	ns
Operating Temperature	T_A		-40		+125	°C

■ STATIC CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		T_A=25°C			T_A=-40°C~+125°C			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
High-level Input Voltage	V_{IH}	V_{CC}=1.65V~1.95V		0.65×V_{CC}			0.65×V_{CC}			V
		V_{CC}=2.3V~2.7V		1.7			1.7			V
		V_{CC}=3V ~3.6V		2			2			V
		V_{CC}=4.5V~5.5V		0.7×V_{CC}			0.7×V_{CC}			V
Low-level Input Voltage	V_{IL}	V_{CC}=1.65V~1.95V				0.35×V_{CC}			0.35×V_{CC}	V
		V_{CC}=2.3V~2.7V				0.7			0.7	V
		V_{CC}=3V~3.6V				0.8			0.8	V
		V_{CC}=4.5V~5.5V				0.3×V_{CC}			0.3×V_{CC}	V
ON-Resistance (Rail)	R_{ON}(rail)	V_I =GND or V_{CC}	V_{CC}=1.65V, I_S=4mA		12	30			45	Ω
			V_{CC}=2.3V, I_S=8mA		9	20			30	Ω
			V_{CC}=3V, I_S=24mA		7.5	15			23	Ω
			V_{CC}=4.5V, I_S=32mA		5.5	10			15	Ω
ON-Resistance (Peak)	R_{ON}(peak)	V_I =GND to V_{CC}	V_{CC}=1.65V, I_S=4mA		105	140			185	Ω
			V_{CC}=2.3V, I_S=8mA		30	40			50	Ω
			V_{CC}=3V, I_S=24mA		11.5	20			30	Ω
			V_{CC}=4.5V, I_S=32mA		7.5	15			23	Ω
On-state Switch Leakage Current	$I_{S(ON)}$	V_I = V_{CC} or GND, V_C =V_{IH}, V_O = Open, V_{CC}=5.5V				±0.1			2	μA
Off-state Switch Leakage Current	$I_{S(off)}$	V_I = V_{CC} and V_O= GND or V_I = GND and V_O = V_{CC}, V_C =V_{IL}, V_{CC}=5.5V				±0.1			1	μA
Control Input Current	$I_{I(CTL)}$	V_C = V_{CC} or GND, V_{CC}=5.5V				±0.1			1	μA
Quiescent Supply Current	I_{CC}	V_C = V_{CC} or GND, V_{CC}=5.5V				1			10	μA
Additional Quiescent Supply Current	ΔI_{CC}	V_C = V_{CC} -0.6V, V_{CC}=5.5V				500			500	μA

■ ANALOG SWITCH CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Frequency Response From Input (A or B) to Output (B or A) (Note 1) (Switch ON)	f_{MAX}	C_L=50pF, R_L=600Ω, F_{IN}=Wine Wave	V_{CC}=1.65V		35		MHz
			V_{CC}=2.3		120		MHz
			V_{CC}=3V		175		MHz
			V_{CC}=4.5V		195		MHz
		C_L=5pF, R_L=50Ω, F_{IN}=Sine Wave	V_{CC}=1.65V		>300		MHz
			V_{CC}=2.3V		>300		MHz
			V_{CC}=3V		>300		MHz
			V_{CC}=4.5V		>300		MHz
Crosstalk Voltage From Input (C) to Output (A or B) (Control Input to Signal Output)	V_{CT}	C_L=50pF, R_L=600Ω, F_{IN}=1MHZ (Square Wave)	V_{CC}=1.65V		35		mV
			V_{CC}=2.3V		50		mV
			V_{CC}=3V		70		mV
			V_{CC}=4.5V		100		mV
Feedthrough Attenuation From Input (A or B) to Output (B or A) (Note 2) (Switch OFF)	α_{iso}	C_L=50pF, R_L=600Ω, F_{IN}=1MHZ (Square Wave)	V_{CC}=1.65V		-58		dB
			V_{CC}=2.3V		-58		dB
			V_{CC}=3V		-58		dB
			V_{CC}=4.5V		-58		dB
		C_L=5pF, R_L=50Ω, F_{IN}=1MHz (Square Wave)	V_{CC}=1.65V		-42		dB
			V_{CC}=2.3V		-42		dB
			V_{CC}=3V		-42		dB
			V_{CC}=4.5V		-42		dB
Sine-Wave Distortion From Input (A or B) to Output (B or A)	THD	C_L=50pF, R_L=10KΩ, F_{IN}=1KHZ (Square 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_L=10kΩ, F_{IN}=10KHz (Square 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.

■ DYNAMIC CHARACTERISTICS (Unless otherwise specified)

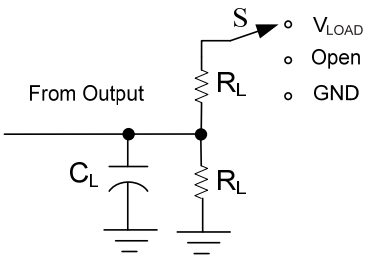
PARAMETER	SYMBOL	TEST CONDITIONS	T_A=25°C			T_A=-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Propagation Delay From Input (A or B) to Output (B or A)	t_{PD} (Note 1)	V_{CC}=1.8V±0.15V			3			4	ns
		V_{CC}=2.5V±0.2V			2.4			3.4	ns
		V_{CC}=3.3V±0.3V			2.2			3.2	ns
		V_{CC}=5V±0.5V			2			3	ns
Enable Time From Input (C) to Output (A or B)	t_{EN} (Note 2)	V_{CC}=1.8V±0.15V	1.0		12			15.5	ns
		V_{CC}=2.5V±0.2V	1.0		7.5			9.5	ns
		V_{CC}=3.3V±0.3V	1.0		6.5			8	ns
		V_{CC}=5V±0.5V	1.0		5.5			6.5	ns
Disable Time From Input (C) to Output (A or B)	t_{DIS} (Note 3)	V_{CC}=1.8V±0.15V	1.0		10			13	ns
		V_{CC}=2.5V±0.2V	1.0		6.9			9	ns
		V_{CC}=3.3V±0.3V	1.0		6.5			8.5	ns
		V_{CC}=5V±0.5V	1.0		5			6.5	ns

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°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Cic Control input Capacitance	C_{IC}	V_{CC}=5V		2		pF
$C_{IO(OFF)}$ Switch Input/Output Capacitance	C_{OFF}	V_{CC}=5V		6		pF
$C_{IO(ON)}$ Switch Input/Output Capacitance	C_{ON}	V_{CC}=5V		13		pF
Power Dissipation Capacitance	C_{PD}	V_{CC}=3.3V, f=10MHz		9		pF

■ TEST CIRCUIT AND WAVEFORMS



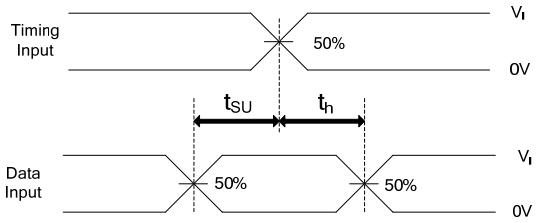
TEST	S
t_{PLH}/t_{PHL}	Open
t_{PHZ}/t_{PZH}	GND
t_{PLZ}/t_{PZL}	V_{LOAD}

t_{PD} is the same as t_{PHL} and t_{PLH}.
t_{en} is the same as t_{PZL} and t_{PZH}.
t_{dis} is the same as t_{PLZ} and t_{PHZ}.

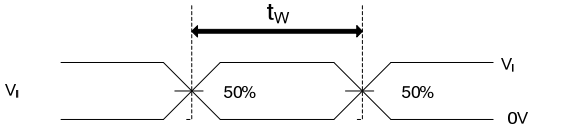
TEST CIRCUIT

Note: C_L includes probe and jig capacitance.

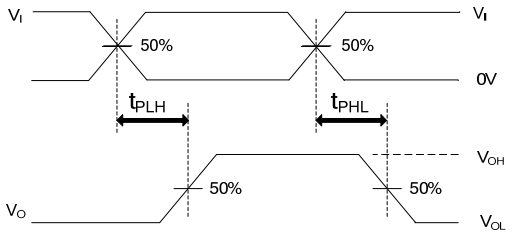
V_{CC}	V_I	t_R, t_F	V_M	V_{LOAD}	C_L	R_L	$V_\triangle$
1.65V~1.95V	V_{CC}	≤2ns	$V_{CC}/2$	2×Vcc	30pF	1kΩ	0.15V
2.3V~2.7V	V_{CC}	≤2ns	$V_{CC}/2$	2×Vcc	30pF	500Ω	0.15V
3.0V~3.6V	V_{CC}	≤2.5ns	$V_{CC}/2$	2×Vcc	50pF	500Ω	0.3V
4.5V~5.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2×Vcc	50pF	500Ω	0.3V



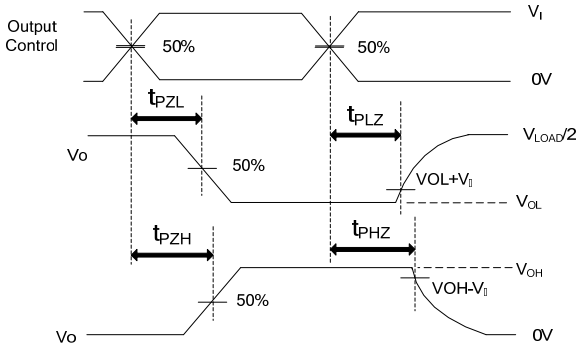
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



PROPAGATION DELAY TIMES

ENABLE AND DISABLE TIMES

■ TYPICAL CHARACTERISTICS (Cont.)