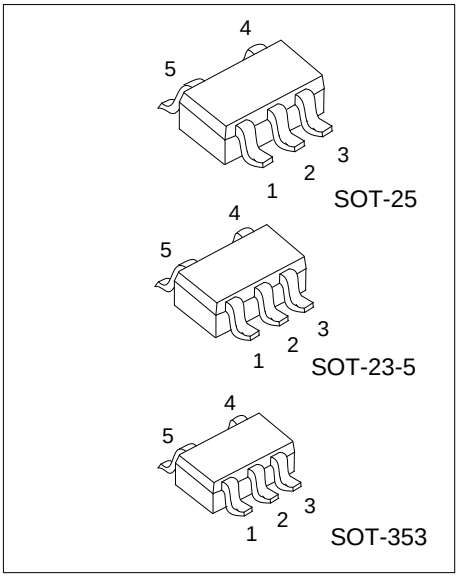
U74LVC1G66

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 Tpd of 0.8 ns at 3.3V
* High Degree of Linearity

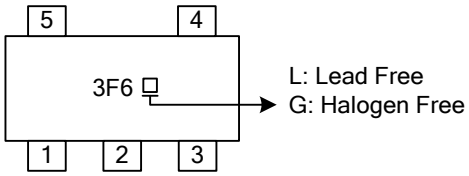
■ ORDERING INFORMATION

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

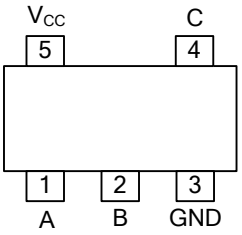
U74LVC1G66G-AE5-R
(1)Packing Type
(2)Package Type
(3)Green Package

(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



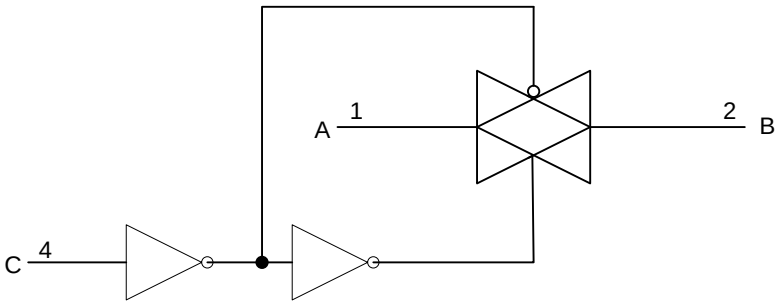
■ PIN CONFIGURATION



■ 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 $V_{I/O}$ >Vcc)	I_{IOK}	±50	mA
On-state Switch Current($V_{I/O}$: 0 to Vcc)	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

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	°C

■ STATIC CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-level Input Voltage	V_{IH}	V_{CC}=1.65V~1.95V	0.65×V_{CC}			V
		V_{CC}=2.3V~2.7V	1.7			V
		V_{CC}=3V ~3.6V	2			V
		V_{CC}=4.5V~5.5V	0.7×V_{CC}			V
Low-level Input Voltage	V_{IL}	V_{CC}=1.65V~1.95V			0.35×V_{CC}	V
		V_{CC}=2.3V~2.7V			0.7	V
		V_{CC}=3V~3.6V			0.8	V
		V_{CC}=4.5V~5.5V			0.3×V_{CC}	V
Input transition rise/fall time	△t/△v	V_{CC}=1.65V~1.95V			20	ns
		V_{CC}=2.3V~2.7V			20	
		V_{CC}=3V~3.6V			10	
		V_{CC}=4.5V~5.5V			10	

■ STATIC CHARACTERISTICS(Cont.) (T_A =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
ON-resistance(rail)	R_{ON}(rail)	V_I =GND or V_{CC}	V_{CC}=1.65V, I_S=4mA		12	30	Ω
			V_{CC}=2.3V, I_S=8mA		9	20	
			V_{CC}=3V, I_S=24mA		7.5	15	
			V_{CC}=4.5V, I_S=32mA		5.5	10	
ON-resistance(peak)	R_{ON}(peak)	V_I =GND 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} or GND, V_C =V_{IH}, V_O = Open, V_{CC}=5.5V				±0.1	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	μA
Control input current	$I_{I(CTL)}$	V_C = V_{CC} or GND, V_{CC}=5.5V				±0.1	μA
Quiescent Supply Current	I_{CC}	V_C = V_{CC} 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

■ 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=600Ω, F_{IN}=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 =50Ω, F_{IN} =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 =600Ω, F_{IN} =1MHZ(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 =600Ω, F_{IN} =1MHZ(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 =50Ω, F_{IN} =1MHz(sine wave)	V_{CC}=1.65V	-42	
				V_{CC}=2.3V	-42	
				V_{CC}=3V	-42	
				V_{CC}=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 =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_L =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.

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

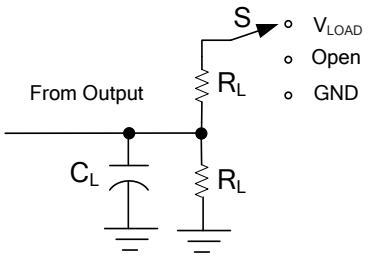
2. t_{PZL} and t_{PZH} are the same as t_{EN}.

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
Power Dissipation Capacitance	C_{PD}	V_{CC}=3.3V, f=10MHz		9		pF

■ TEST CIRCUIT AND WAVEFORMS

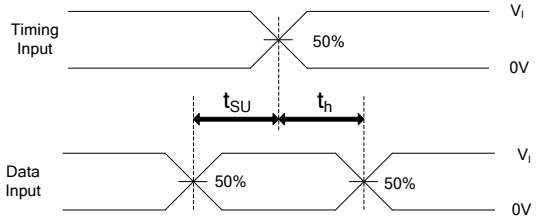


TEST CIRCUIT

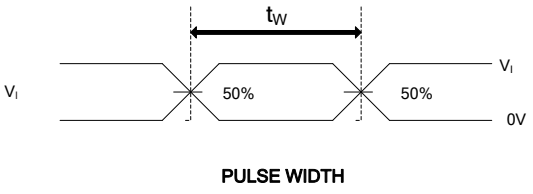
TEST	S
T_{PLH}/T_{PHL}	OPEN
T_{PHZ}/T_{PZH}	GND
T_{PLZ}/T_{PZL}	V_{LOAD}

Note: C_L includes probe and jig capacitance.

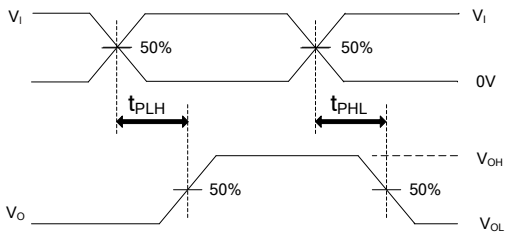
V_{CC}	V_I	t_R, t_F	V_M	V_{LOAD}	C_L	R_L	$V_\triangle$
1.65V~1.95V	V_{CC}	≤2ns	$V_{CC}/2$	2×Vcc	30pF	1kΩ	0.15V
2.3V~2.7V	V_{CC}	≤2ns	$V_{CC}/2$	2×Vcc	30pF	500Ω	0.15V
3.0V~3.6V	V_{CC}	≤2.5ns	$V_{CC}/2$	2×Vcc	50pF	500Ω	0.3V
4.5V~5.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2×Vcc	50pF	500Ω	0.3V



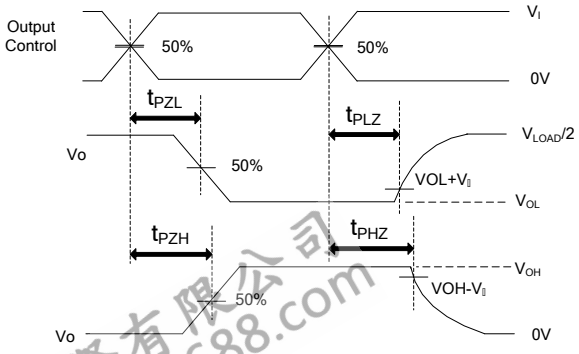
SETUP TIME AND HOLD TIME



PULSE WIDTH



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES