



# U74LVC1G3157

**CMOS IC**

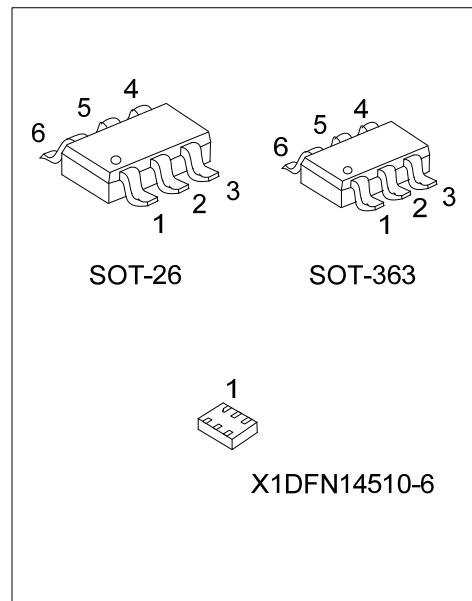
## SINGLE-POLE, DOUBLE-THROW ANALOG SWITCH

### DESCRIPTION

The UTC **U74LVC1G3157** is a low voltage single-pole, double-throw (SPDT) analog switch intending for use in chopping, modem, signal gating, and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.

### FEATURES

- \* Useful in Both Analog and Digital Applications
- \* Rail-to-Rail Signal Handing
- \* Low ON Resistance: < 10Ω on Typical @ 3.3V V<sub>CC</sub>
- \* Broad V<sub>CC</sub> Operating Range: 1.65V to 5.5V
- \* Over-Voltage Tolerance of Control Input to 6.5V



### ORDERING INFORMATION

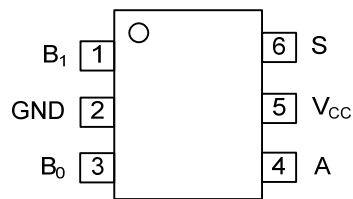
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G3157L-AG6-R	U74LVC1G3157G-AG6-R	SOT-26	Tape Reel
U74LVC1G3157L-AL6-R	U74LVC1G3157G-AL6-R	SOT-363	Tape Reel
U74LVC1G3157L-KAP-R	U74LVC1G3157G-KAP-R	X1DFN14510-6	Tape Reel

<p>U74LVC1G3157G-AG6-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) AG6: SOT-26, AL6: SOT-363, KAP: X1DFN14510-6</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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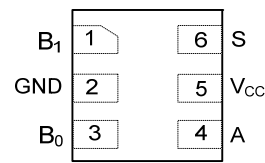
### MARKING

SOT-26 / SOT-363	X1DFN14510-6

## ■ PIN CONFIGURATION



SOT-26 / SOT-363



X1DFN14510-6  
(TOP VIEW)

## ■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	B1	Independent input or output
2	GND	Ground (0 V)
3	B0	Independent input or output
4	A	Common output or input
5	V <sub>CC</sub>	Supply voltage
6	S	Select input

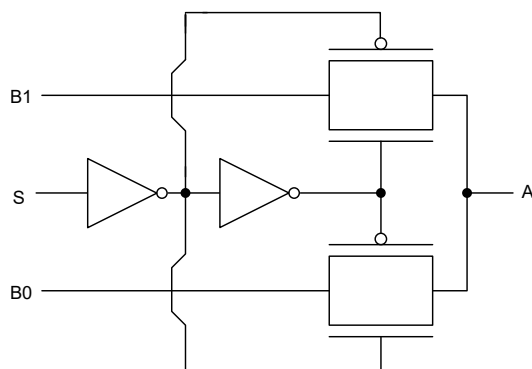
## ■ FUNCTION TABLE

INPUT(S)	OUTPUT(Y)
L	B0 Connected to A
H	B1 Connected to A

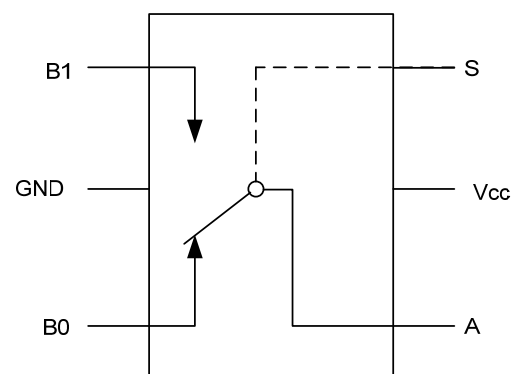
H=High Level

L=Low Level

## ■ LOGIC DIAGRAM



Logic Symbol



Analog Symbol

■ ABSOLUTE MAXIMUM RATING (Unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	-0.5 ~ +6.5	V
Switch Voltage	V <sub>S</sub>	-0.5 ~ V <sub>CC</sub> +0.5	V
Input Voltage	V <sub>IN</sub>	-0.5 ~ +6.5	V
V <sub>CC</sub> or GND Current	I <sub>CC</sub>	±100	mA
Continuous Output Current	I <sub>OUT</sub>	128	mA
Input Clamp Current (V <sub>IN</sub> <0V)	I <sub>IK</sub>	-50	mA
Junction Temperature	T <sub>J</sub>	+150	°C
Storage Temperature	T <sub>STG</sub>	-65 ~ + 150	°C

Note: 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 (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>		1.65		5.5	V
Control Input Voltage	V <sub>IN</sub>	(Note)	0		V <sub>CC</sub>	V
Switch Input Voltage	V <sub>IN</sub>	(Note)	0		V <sub>CC</sub>	V
Output Voltage	V <sub>OUT</sub>	(Note)	0		V <sub>CC</sub>	V
High-level Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> =1.65V to 1.95V	0.75×V <sub>CC</sub>			V
		V <sub>CC</sub> =2.3V to 5.5V	0.7×V <sub>CC</sub>			V
Low-level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =1.65V to 1.95V			0.25×V <sub>CC</sub>	V
		V <sub>CC</sub> =2.3V to 5.5V			0.3×V <sub>CC</sub>	V
Input Rise or Fall Times	$\frac{\Delta t}{\Delta V}$	Control Input V <sub>CC</sub> =2.3V~3.6V			10	ns/V
		Control Input V <sub>CC</sub> =4.5V~5.5V			5	ns/V
Operating Temperature	T <sub>A</sub>		-40		+125	°C

Note: Control input must be held HIGH or LOW; it must not float.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-26	230	°C/W
	SOT-363	330	°C/W
	X1DFN14510-6	400	°C/W
Junction to Case	SOT-26	90	°C/W
	SOT-363	110	°C/W
	X1DFN14510-6	260	°C/W

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Switch On Resistance	R <sub>ON</sub>	V <sub>CC</sub> =4.5V, V <sub>IN</sub> =0V, I <sub>OUT</sub> =30mA		4	7		6	8	Ω
		V <sub>CC</sub> =4.5V, V <sub>IN</sub> =2.4V, I <sub>OUT</sub> =-30mA		7	12		7	13	Ω
		V <sub>CC</sub> =4.5V, V <sub>IN</sub> =4.5V, I <sub>OUT</sub> =-30mA		8	15		7	16	Ω
		V <sub>CC</sub> =3V, V <sub>IN</sub> =0V, I <sub>OUT</sub> =24mA		5	9		7	10	Ω
		V <sub>CC</sub> =3V, V <sub>IN</sub> =3V, I <sub>OUT</sub> =-24mA		11	20.0		9	20	Ω
		V <sub>CC</sub> =2.3V, V <sub>IN</sub> =0V, I <sub>OUT</sub> =8mA		6	12.0		8	13	Ω
		V <sub>CC</sub> =2.3V, V <sub>IN</sub> =2.3V, I <sub>OUT</sub> =-8mA		14	30.0		11	30	Ω
		V <sub>CC</sub> =1.65V, V <sub>IN</sub> =0V, I <sub>OUT</sub> =4mA		10	20.0		11	20	Ω
		V <sub>CC</sub> =1.65V, V <sub>IN</sub> =1.65V, I <sub>OUT</sub> =-4mA		16	50.0		17	50	Ω
On Resistance Match Between Channel	ΔR <sub>ON</sub>	V <sub>CC</sub> =4.5V, V <sub>BN</sub> =3.15V, I <sub>A</sub> =-30mA		0.15			0.2		Ω
		V <sub>CC</sub> =3V, V <sub>BN</sub> =2.1V, I <sub>A</sub> =-24mA		0.2			0.3		Ω
		V <sub>CC</sub> =2.3V, V <sub>BN</sub> =1.6V, I <sub>A</sub> =-8mA		0.5			0.5		Ω
		V <sub>CC</sub> =1.65V, V <sub>BN</sub> =1.15V, I <sub>A</sub> =-4mA		0.5			0.5		Ω
Input Leakage Current	I <sub>I(LEAK)</sub>	V <sub>CC</sub> =0 to 5.5V, 0≤V <sub>IN</sub> ≤5.5V			±0.1			±0.1	μA
Off State Leakage Current	I <sub>OFF</sub>	V <sub>CC</sub> =1.65 to 5.5V, 0≤A,B≤V <sub>CC</sub>			±0.1			±0.1	μA
Quiescent Supply Current	I <sub>Q</sub>	V <sub>CC</sub> =5.5V, V <sub>IN</sub> =V <sub>CC</sub> or GND, I <sub>OUT</sub> =0			1			±1	μA
Analog Signal Range		V <sub>CC</sub> =V <sub>CC</sub> , V <sub>IN</sub> =V <sub>CC</sub> or GND	0		V <sub>CC</sub>	0		V <sub>CC</sub>	V

■ SWITCHING CHARACTERISTICS (see TEST CIRCUIT AND WAVEFORMS)

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40~+125°C			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
Propagation Delay Bus to Bus(Note)	t <sub>PLH</sub> t <sub>PHL</sub>	C <sub>L</sub> =50 pF, R <sub>L</sub> =500Ω	V <sub>CC</sub> =1.65 ~ 1.95V			4.5			5.0	ns
			V <sub>CC</sub> =2.3 ~ 2.7V			2.0			2.5	ns
			V <sub>CC</sub> =3.0 ~ 3.6V			1.0			1.5	ns
			V <sub>CC</sub> =4.5 ~ 5.5V			0.5			0.7	ns
Output Enable Time Turn-On Time (A to B <sub>N</sub> )	t <sub>pZL</sub> t <sub>pZH</sub>	C <sub>L</sub> =50 pF, R <sub>L</sub> =500Ω	V <sub>CC</sub> =1.65 ~ 1.95V	1.0		23.0	1.0		25	ns
			V <sub>CC</sub> =2.3 ~ 2.7V	1.0		13.0	1.0		15	ns
			V <sub>CC</sub> =3.0 ~ 3.6V	1.0		7.0	1.0		9.0	ns
			V <sub>CC</sub> =4.5 ~ 5.5V	0.5		5.5	0.5		7.0	ns
Output Enable Time Turn-Off Time (A to B <sub>N</sub> )	t <sub>PHZ</sub> t <sub>PLZ</sub>	C <sub>L</sub> =50 pF, R <sub>L</sub> =500Ω	V <sub>CC</sub> =1.65 ~ 1.95V	1.0		13.0	1.0		15	ns
			V <sub>CC</sub> =2.3 ~ 2.7V	1.0		7.0	1.0		9.0	ns
			V <sub>CC</sub> =3.0 ~ 3.6V	1.0		5.0	1.0		6.0	ns
			V <sub>CC</sub> =4.5 ~ 5.5V	0.5		4.0	0.5		5.0	ns

Note: Guaranteed by design.

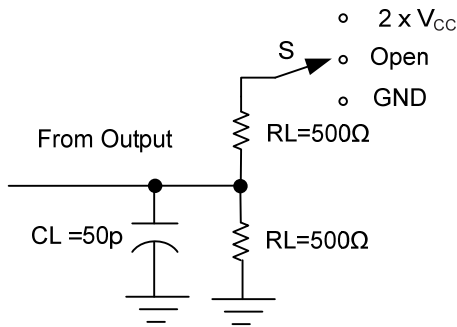
■ DYNAMIC CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Bandwidth	BW	R <sub>L</sub> =50Ω, Switch ON	V <sub>CC</sub> =1.8V		220		MHz
			V <sub>CC</sub> =2.3V		220		MHz
			V <sub>CC</sub> =3.0V		220		MHz
			V <sub>CC</sub> =4.5V		220		MHz
OFF Isolation	O <sub>ISO</sub>	R <sub>L</sub> =50Ω, f=10MHz, Switch OFF	V <sub>CC</sub> =1.8V		-60		dB
			V <sub>CC</sub> =2.3V		-65		dB
			V <sub>CC</sub> =3.0V		-65		dB
			V <sub>CC</sub> =4.5V		-65		dB
Crosstalk	X <sub>TALK</sub>	R <sub>L</sub> =50Ω, f=10MHz, Switch ON	V <sub>CC</sub> =1.8V		-66		dB
			V <sub>CC</sub> =2.3V		-66		dB
			V <sub>CC</sub> =3.0V		-66		dB
			V <sub>CC</sub> =4.5V		-66		dB
Total Harmonic Distortion	THD	R <sub>L</sub> =600Ω, C <sub>L</sub> =50pF, f=600Hz~20KHz	V <sub>CC</sub> =1.8V		0.015		%
			V <sub>CC</sub> =2.3V		0.025		%
			V <sub>CC</sub> =3.0V		0.015		%
			V <sub>CC</sub> =4.5V		0.01		%

■ OPERATING CHARACTERISTICS (Unless otherwise specified)

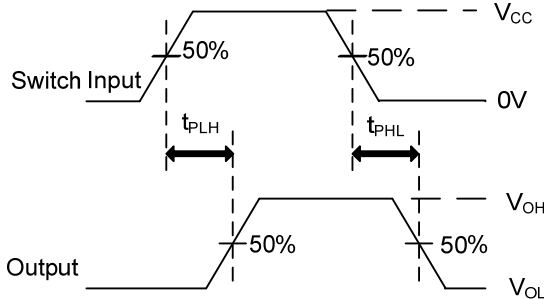
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Control Pin Input Capacitance	C <sub>IN</sub>	V <sub>CC</sub> =0V		2.3		pF
B Port Off Capacitance	C <sub>IO-B</sub>	V <sub>CC</sub> =5.0V		6.5		pF
A Port Capacitance When Switch Is Enabled	C <sub>IOA-ON</sub>	V <sub>CC</sub> =5.0V		18.5		pF

■ TEST CIRCUIT AND WAVEFORMS



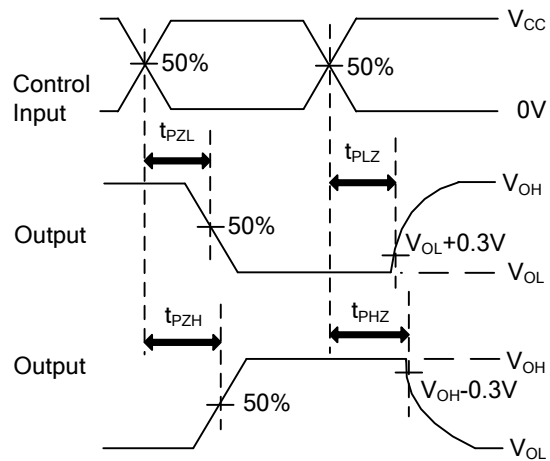
TEST CIRCUIT

TEST	S
$t_{PLH}/t_{PHL}$	Open
$t_{PHZ}/t_{PZH}$	GND
$t_{PLZ}/t_{PZL}$	$2 \times V_{CC}$



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES

Note:  $C_L$  includes probe and jig capacitance.  
 $PRR \leq 1\text{MHz}$ ,  $Z_o = 50\Omega$ ,  $t_r \leq 2.5\text{ns}$ ,  $t_f \leq 2.5\text{ns}$ .



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES

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