



## U74LVC3157

CMOS IC

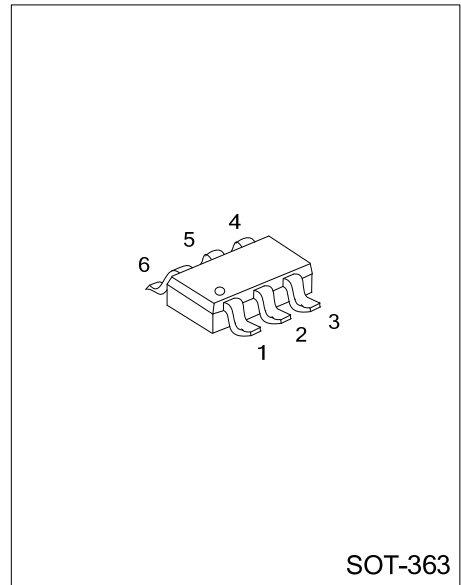
### SINGLE-POLE, DOUBLE-THROW ANALOG SWITCH

#### DESCRIPTION

The UTC **U74LVC3157** 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 Handling
- \* 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 7.0V

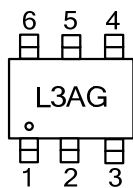


#### ORDERING INFORMATION

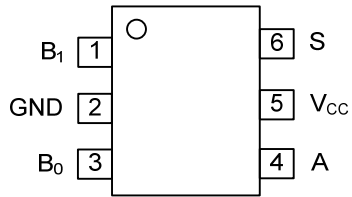
Ordering Number	Package	Packing
U74LVC3157G-AL6-R	SOT-363	Tape Reel

<p>U74LVC3157G-AL6-R</p> <p>(1) Packing Type (2) Package Type (3) Halogen Free</p>	<p>(1) R: Tape Reel (2) AL6: SOT-363 (3) G: Halogen Free</p>
--	--

#### MARKING



■ PIN CONFIGURATION

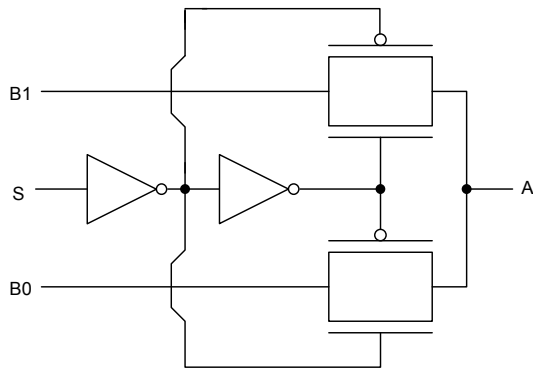


■ FUNCTION TABLE

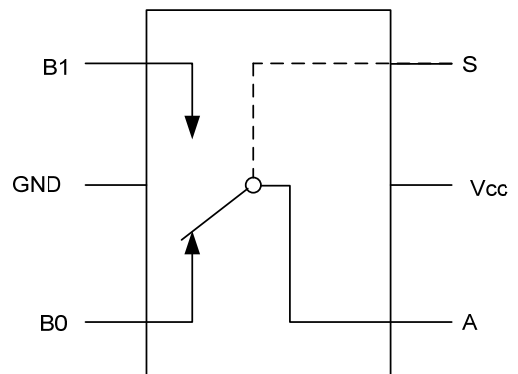
INPUT(S)	OUTPUT(Y)
L	B0 Connected to A
H	B1 Connected to A

H=High Level  
L=Low Level

■ LOGIC DIAGRAM



Logic Symbol



Analog Symbol

## ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5 ~ +7.0	V
Switch Voltage	$V_S$	-0.5 ~ $V_{CC}+0.5$	V
Input Voltage	$V_{IN}$	-0.5 ~ +7.0	V
$V_{CC}$ or GND Current	$I_{CC}$	±100	mA
Continuous Output Current	$I_{OUT}$	128	mA
Input Clamp Current ( $V_{IN}<0V$ )	$I_{IK}$	-50	mA
Operating Temperature	$T_{OPR}$	-40 ~ + 85	°C
Storage Temperature	$T_{STG}$	-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.

## ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	270	°C/W

## ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$		1.65		5.5	V
Control Input Voltage	$V_{IN}$	(Note)	0		$V_{CC}$	V
Switch Input Voltage	$V_{IN}$	(Note)	0		$V_{CC}$	V
Output Voltage	$V_{OUT}$	(Note)	0		$V_{CC}$	V
High-level Input Voltage	$V_{IH}$	$V_{CC}=1.65V$ to $1.95V$	$0.75 \times V_{CC}$			V
		$V_{CC}=2.3V$ to $5.5V$	$0.7 \times V_{CC}$			V
Low-level Input Voltage	$V_{IL}$	$V_{CC}=1.65V$ to $1.95V$			$0.25 \times V_{CC}$	V
		$V_{CC}=2.3V$ to $5.5V$			$0.3 \times V_{CC}$	V
Input Rise or Fall Times	$\frac{\Delta t}{\Delta V}$	Control Input $V_{CC}=2.3V \sim 3.6V$			10	ns/V
		Control Input $V_{CC}=4.5V \sim 5.5V$			5	ns/V

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

## ■ ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Switch On Resistance	$R_{ON}$	$V_{CC}=4.5V, V_{IN}=0V, I_{OUT}=30mA$		3.0	7.0	$\Omega$
		$V_{CC}=4.5V, V_{IN}=2.4V, I_{OUT}=-30mA$		5.0	12.0	$\Omega$
		$V_{CC}=4.5V, V_{IN}=4.5V, I_{OUT}=-30mA$		7.0	15.0	$\Omega$
		$V_{CC}=3V, V_{IN}=0V, I_{OUT}=24mA$		4.0	9.0	$\Omega$
		$V_{CC}=3V, V_{IN}=3V, I_{OUT}=-24mA$		10.0	20.0	$\Omega$
		$V_{CC}=2.3V, V_{IN}=0V, I_{OUT}=8mA$		5.0	12.0	$\Omega$
		$V_{CC}=2.3V, V_{IN}=2.3V, I_{OUT}=-8mA$		13.0	30.0	$\Omega$
		$V_{CC}=1.65V, V_{IN}=0V, I_{OUT}=4mA$		6.5	20.0	$\Omega$
		$V_{CC}=1.65V, V_{IN}=1.65V, I_{OUT}=-4mA$		17.0	50.0	$\Omega$
On Resistance Match Between Channel	$\Delta R_{ON}$	$V_{CC}=4.5V, V_{BN}=3.15V, I_A=-30mA$		0.15		$\Omega$
		$V_{CC}=3V, V_{BN}=2.1V, I_A=-24mA$		0.2		$\Omega$
		$V_{CC}=2.3V, V_{BN}=1.6V, I_A=-8mA$		0.5		$\Omega$
		$V_{CC}=1.65V, V_{BN}=1.15V, I_A=-4mA$		0.5		$\Omega$
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0$ to $5.5V, 0 \leq V_{IN} \leq 5.5V$			±0.1	$\mu A$
Off State Leakage Current	$I_{OFF}$	$V_{CC}=1.65$ to $5.5V, 0 \leq A, B \leq V_{CC}$			±0.1	$\mu A$
Quiescent Supply Current	$I_Q$	$V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			1	$\mu A$
Analog Signal Range		$V_{CC}=V_{CC}, V_{IN}=V_{CC}$ or GND	0		$V_{CC}$	V

## ■ SWITCHING CHARACTERISTICS (see TEST CIRCUIT AND WAVEFORMS)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation Delay Bus to Bus(Note)	$t_{PLH}$ $t_{PHL}$	$C_L=50\text{ pF}$ , $R_L=500\Omega$	$V_{CC}=1.65 \sim 1.95\text{V}$		3.5	ns
			$V_{CC}=2.3 \sim 2.7\text{V}$		1.2	ns
			$V_{CC}=3.0 \sim 3.6\text{V}$		0.8	ns
			$V_{CC}=4.5 \sim 5.5\text{V}$		0.3	ns
Output Enable Time Turn-On Time (A to B <sub>N</sub> )	$t_{PZL}$ $t_{PZH}$	$C_L=50\text{ pF}$ , $R_L=500\Omega$	$V_{CC}=1.65 \sim 1.95\text{V}$	7.0	23.0	ns
			$V_{CC}=2.3 \sim 2.7\text{V}$	3.5	13.0	ns
			$V_{CC}=3.0 \sim 3.6\text{V}$	2.5	6.9	ns
			$V_{CC}=4.5 \sim 5.5\text{V}$	1.7	5.2	ns
Output Enable Time Turn-Off Time (A to B <sub>N</sub> )	$t_{PHZ}$ $t_{PLZ}$	$C_L=50\text{ pF}$ , $R_L=500\Omega$	$V_{CC}=1.65 \sim 1.95\text{V}$	3.0	12.5	ns
			$V_{CC}=2.3 \sim 2.7\text{V}$	2.0	7.0	ns
			$V_{CC}=3.0 \sim 3.6\text{V}$	1.2	5.0	ns
			$V_{CC}=4.5 \sim 5.5\text{V}$	0.8	3.5	ns

Note: Guaranteed by design.

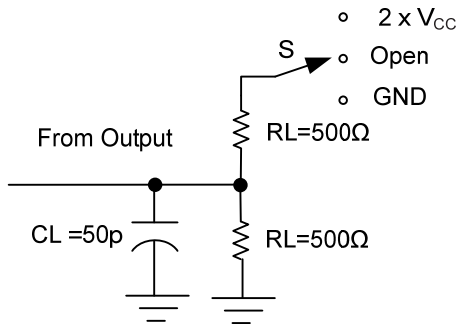
## ■ DYNAMIC CHARACTERISTICS ( $T_a=25^\circ\text{C}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Bandwidth	BW	$R_L=50\Omega$ , Switch ON	$V_{CC}=1.8\text{V}$		220	MHz
			$V_{CC}=2.3\text{V}$		220	MHz
			$V_{CC}=3.0\text{V}$ ,		220	MHz
			$V_{CC}=4.5\text{V}$		220	MHz
OFF Isolation	$O_{ISO}$	$R_L=50\Omega$ , $f=10\text{MHz}$ , Switch OFF	$V_{CC}=1.8\text{V}$ ,		-60	dB
			$V_{CC}=2.3\text{V}$		-65	dB
			$V_{CC}=3.0\text{V}$		-65	dB
			$V_{CC}=4.5\text{V}$		-65	dB
Crosstalk	$X_{TALK}$	$R_L=50\Omega$ , $f=10\text{MHz}$ , Switch ON	$V_{CC}=1.8\text{V}$		-66	dB
			$V_{CC}=2.3\text{V}$		-66	dB
			$V_{CC}=3.0\text{V}$		-66	dB
			$V_{CC}=4.5\text{V}$		-66	dB
Total Harmonic Distortion	THD	$R_L=600\Omega$ , $C_L=50\text{pF}$ , $f=600\text{Hz} \sim 20\text{KHz}$	$V_{CC}=1.8\text{V}$		0.015	%
			$V_{CC}=2.3\text{V}$		0.025	%
			$V_{CC}=3.0\text{V}$		0.015	%
			$V_{CC}=4.5\text{V}$		0.01	%

## ■ OPERATING CHARACTERISTICS ( $T_a=25^\circ\text{C}$ )

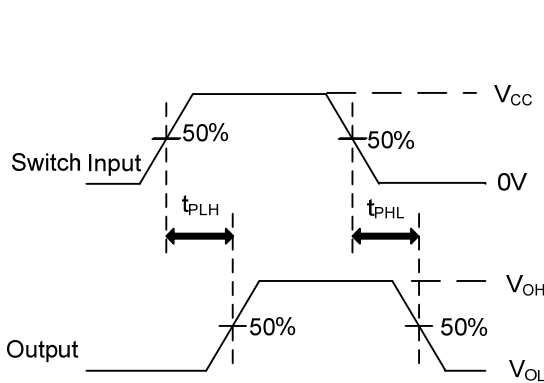
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Control Pin Input Capacitance	$C_{IN}$	$V_{CC}=0\text{V}$		2.3		pF
B Port Off Capacitance	$C_{IO-B}$	$V_{CC}=5.0\text{V}$		6.5		pF
A Port Capacitance When Switch Is Enabled	$C_{IOA-ON}$	$V_{CC}=5.0\text{V}$		18.5		pF

## ■ TEST CIRCUIT AND WAVEFORMS

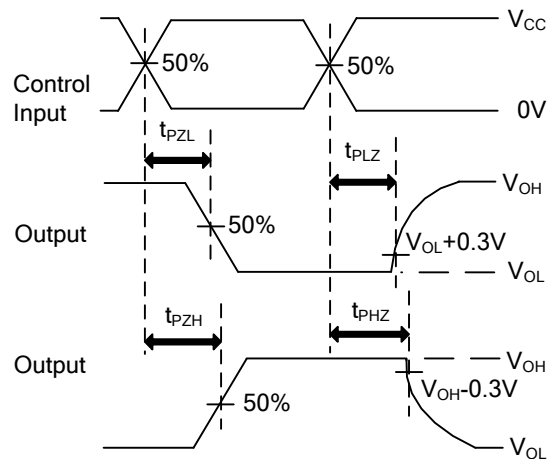


TEST CIRCUIT

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



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES

Note:  $C_L$  includes probe and jig capacitance.  
 $PRR \leq 1\text{MHz}$ ,  $Z_0 = 50\Omega$ ,  $t_R \leq 2.5\text{ns}$ ,  $t_F \leq 2.5\text{ns}$ .

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.