

General Description

The 74LVC1G3157GW-CN is an advanced CMOS analog switch fabricated with silicon gate CMOS technology. It achieves very low propagation delay and R_{DS(on)} resistances while maintaining CMOS low power dissipation. Analog and digital voltages that may vary across the full power-supply range (from V_{CC} to GND).

The Select pin has over voltage protection that allows voltages above V_{CC}, up to 7.0 V to be present on the pin without damage or disruption of operation of the part, regardless of the operating voltage.

74LVC1G3157GW-CN offered in a small SC70-6 package, which is ideal for small form factor portable equipment.

Features

V_{CC} Operating Range from 1.65 V to 5.5 V

High speed and low delay

Low power dissipation

Standard CMOS logic levels

High bandwidth up to 250MHz, improved linearity

Low R_{DS(on)} is 3.0Ω @ V_{CC} =4.5V

Break before make Circuitry, Prevents inadvertent shorts

Operating temperature for -40°C~+85°C

Part No. and package

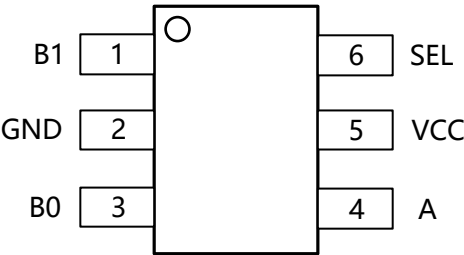
Part No.	Package	MSL
74LVC1G3157GW-CN	SC70-6 (2.05mm ×2.3mm)	Level 3

Applications

NTSC/PAL Video

Audio Signal Routing

SPDIF and HDTV

Pin Configuration

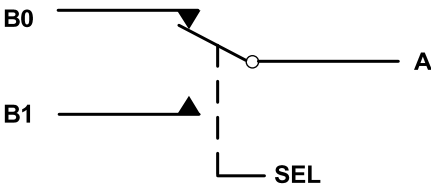
SC70-6

Pin Function

Pin Number	I/O	Pin Function
A, B0, B1	I/O	Data port
SEL	I	Controlling choice
VCC	—	Power supply port
GND	—	Ground

Functions Description

SEL port Level	Function
L	B0 Connected to A
H	B1 Connected to A

Analog Symbol

Analog Symbol

Absolute Maximum Ratings

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.5~+7.0	V
DC Switch Voltage ⁽¹⁾	V_{IN}	-0.5~ $V_{CC}+0.5$	V
DC Input Voltage ⁽¹⁾	V_S	-0.5~+7.0	V
DC Input Diode Current @ $V_{IN}<0V$	I_{IK}	-50	mA
DC Output Current	I_{OUT}	128	mA
DC V_{CC} or Ground Current	I_{CC} / I_{GND}	100	mA
Storage Temperature Range	T_{STG}	-65~+150	°C
Junction Temperature Under Bias	T_J	150	°C
Junction Lead Temperature (Soldering 10 Seconds)	T_{SOLD}	260	°C
HBM Max Capability (EIA/JESD22-A114)	V_{ESD}	± 4000	V
CDM Max Capability (JESD22-C101)		± 1000	V
Latch up Current Maximum Rating (JEDEC78)	I_{LU}	± 200	mA
Power Dissipation @ +85°C	P_D	180	mW

Maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The data sheet specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. ChipNobo does not recommend operation outside data sheet specifications.

Note1. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

Recommended Operating Conditions

Characteristic	Symbol	Min	Max	Unit
Supply Voltage Operating	V_{CC}	1.65	5.5	V
SEL Input Voltage ⁽²⁾	V_S	0	V_{CC}	V
Switch Input Voltage	V_{IN}	0	V_{CC}	V
Output Voltage	V_{OUT}	0	V_{CC}	V
Operating Temperature	T_A	-40	+85	°C
Input Rise and Fall Time Control Input $V_{CC}=2.3V\sim3.6V$ Control Input $V_{CC}=4.5V\sim5.5V$	t_r / t_f	0 0	10 5.0	ns/V

Note2. SEL input must be held HIGH or LOW, it must not float.

Electrical Characteristics

Symbol	Parameter	Test Conditions	V _{CC}	T _A =25°C			T _A =-40~-+85°C		Unit
				Min	Typ	Max	Min	Max	
DC ELECTRICAL CHARACTERISTICS									
V _{IH}	HIGH Level Input Voltage		1.65~1.95				1.0		V
			2.3~2.8				1.5		
			3~4.2				2.4		
			4.5~5.5				2.7		
V _{IL}	LOW Level Input Voltage		1.65~1.95					0.3	V
			2.3~2.8					0.4	
			3~4.2					0.6	
			4.5~5.5					0.8	
I _{IN}	Input Leakage Current	0< V _{IN} <5.5V	0~5.5		±0.05	±0.1		±1	uA
I _{OFF}	OFF State Leakage Current	0< A,B<V _{CC}	1.65~5.5		±0.05	±0.1		±1	uA
I _{CC}	Quiescent Supply	V _{IN} =V _{CC} or GND I _{OUT} =0	5.5			1.0		10	uA
V _{AS}	Analog Signal Range		V _{CC}	0		V _{CC}	0	V _{CC}	V
R _{ON}	Switch On Resistance (3)(7)	V _{IN} =0V, I _O =30mA	4.5		3.0			7.0	Ω
		V _{IN} =2.4V, I _O =-30mA			5.0			12	Ω
		V _{IN} =4.5V, I _O =-30mA			7.0			15	Ω
		V _{IN} =0V, I _O =24mA	3.0		4.0			9.0	Ω
		V _{IN} =3V, I _O =-24mA			10			20	Ω
		V _{IN} =0V, I _O =8mA	2.3		5.0			12	Ω
		V _{IN} =2.3V, I _O =-8mA			13			30	Ω
		V _{IN} =0V, I _O =4mA	1.65		6.5			20	Ω
		V _{IN} =1.65V, I _O =-4mA			17			50	Ω
R _{RANGE}	On Resistance Over Signal Range (3)(7)	I _A =-30mA 0≤V _{Bn} ≤V _{CC}	4.5					25	Ω
		I _A =-24mA 0≤V _{Bn} ≤V _{CC}	3					50	Ω
		I _A =-8mA 0≤V _{Bn} ≤V _{CC}	2.3					100	Ω
		I _A =-4mA 0≤V _{Bn} ≤V _{CC}	1.65					300	Ω

Electrical Characteristics (Continued)

Symbol	Parameter	Test Conditions	V _{CC}	T _A =25°C			T _A =-40~+85°C		Unit
				Min	Typ	Max	Min	Max	
ΔR _{ON}	On Resistance Match Between Channels (3)(4)(5)	I _A =-30mA, V _{Bn} =3.15V	4.5		0.15				Ω
		I _A =-24mA, V _{Bn} = 2.1V	3		0.2				Ω
		I _A =-8mA, V _{Bn} = 1.6V	2.3		0.5				Ω
		I _A =-4mA, V _{Bn} = 1.15V	1.65		0.5				Ω
R _{FLAT}	On Resistance Flatness (3)(4)(6)	I _A =-30mA 0≤V _{Bn} ≤ V _{CC}	5		3.0				Ω
		I _A =-24mA 0≤V _{Bn} ≤V _{CC}	3.3		7.0				Ω
		I _A =-8mA 0≤V _{Bn} ≤V _{CC}	2.5		28				Ω
		I _A =-4mA 0≤V _{Bn} ≤V _{CC}	1.8		125				Ω
AC ELECTRICAL CHARACTERISTICS									
t _{PHL} t _{PLH}	Propagation Delay Bus to Bus (8)	Figure 1 S1=OPEN	1.65~1.95						ns
			2.3~2.7					2.0	ns
			3.0~3.5					2.0	ns
			4.5~5.5					2.0	ns
t _{PZL} t _{PZH}	Output Enable Time, Turn On Time	Figure 1 S1=2*V _{CC} for t _{PZL} ; S1=0V for t _{PZH}	1.65~1.95			23	7.0	24	ns
			2.3~2.7			15	3.5	16	ns
			3.0~3.5			12	2.5	13	ns
			4.5~5.5			10	1.7	11	ns
t _{PLZ} t _{PHZ}	Output Disable Time, Turn Off Time	Figure 1 S1=2*V _{CC} for t _{PLZ} ; S1=0V for t _{PHZ}	1.65~1.95			16	3.0	17	ns
			2.3~2.7			10	2.0	11	ns
			3.0~3.5			8	1.5	9	ns
			4.5~5.5			6	0.8	7	ns
t _{BBM}	Break Before Make Time (7)	Figure 2; C _L =50pF; R _L =600Ω	1.65~1.95				0.5		ns
			2.3~2.7				0.5		ns
			3.0~3.5				0.5		ns
			4.5~5.5				0.5		ns
Q	Charge Injection (7)	Figure3, C _L =0.1nF, R _L =1MΩ	5.0		7.0				pC
			3.3		3.0				pC

Electrical Characteristics (Continued)

Symbol	Parameter	Test Conditions	V _{CC}	T _A =25°C			T _A =-40~+85°C		Unit
				Min	Typ	Max	Min	Max	
O _{IRR}	Off Isolation (9)	Figure 4, R _L =50Ω, f= 10MHz	1.65~5.5		-57				dB
X _{TALK}	Crosstalk	Figure 5, R _L =50Ω, f= 10MHz	1.65~5.5		-54				dB
BW	-3dB Bandwidth	Figure 8, R _L =50Ω	1.65~5.5		250				MHz
THD	Total Harmonic Distortion (7)	R _L =600Ω, 0.5V _{PP} f=600Hz~20k Hz	5.0		0.011				%
C _{IN}	Select Pin Input Capacitance (10)		0		4.5				pF
C _{IO_B}	B Port Off Capacitance (10)	Figure 6	5.0		7.0				pF
C _{IOA_ON}	A Port Capacitance when Switch is Enabled (10)	Figure 7	5.0		21.0				pF

Note3. Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B Ports).

Note4. Parameter is characterized but not tested in production.

Note5. $\Delta R_{ON} = R_{ON_max} - R_{ON_min}$ measured at identical V_{CC}, temperature and voltage levels.

Note6. Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.

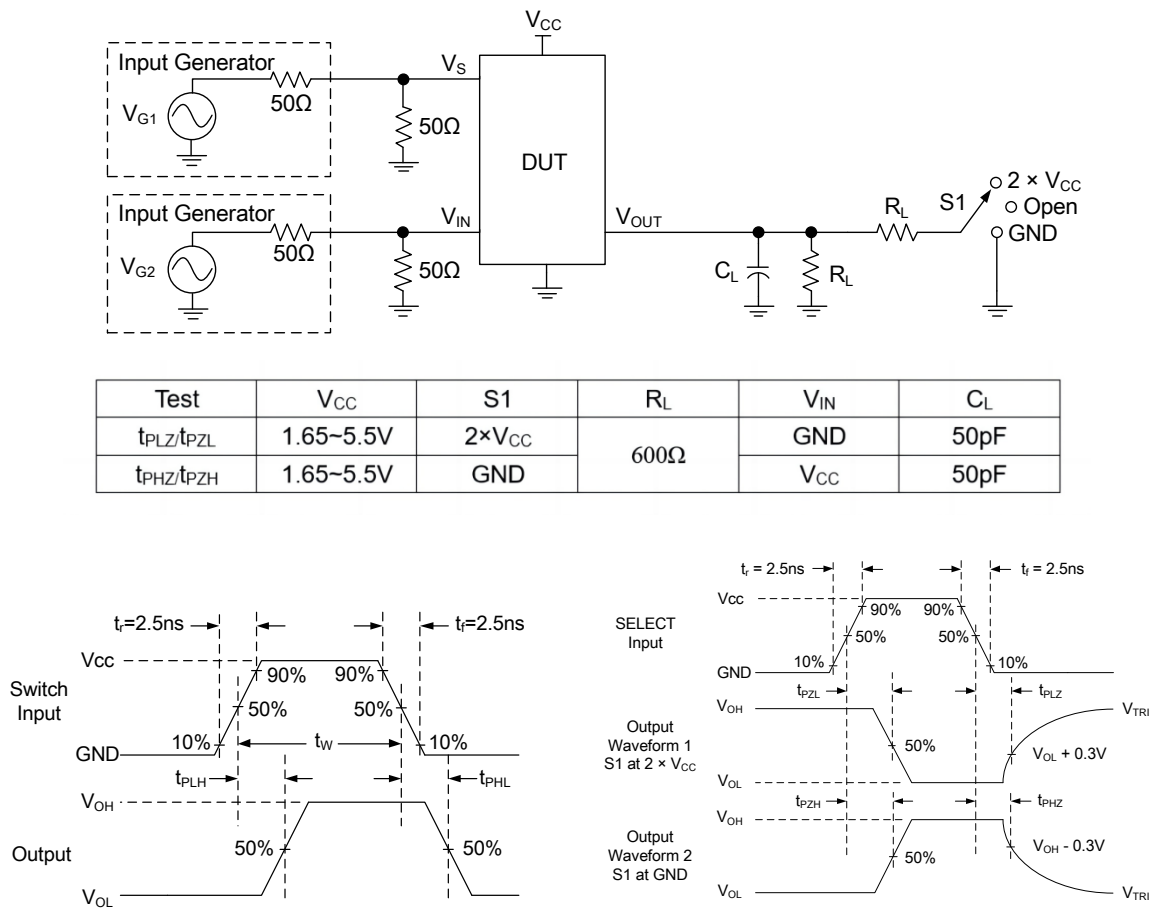
Note7. Guaranteed by Design.

Note8. This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).

Note9. Off Isolation = 20 log₁₀ [V_A/V_{Bn}].

Note10. T_A = +25°C, f = 1 MHz, Capacitance is characterized but not tested in production.

Test Reference Circuit



NOTE : Input driven by 50 Ω source terminated in 50 Ω

NOTE : CL includes load and stray capacitance

Figure 1. AC Test Circuit , AC Waveforms

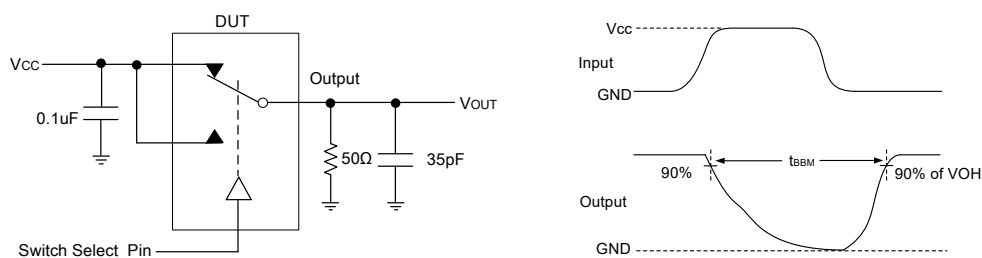


Figure 2. t_{BBM} (Time Break-Before-Make)

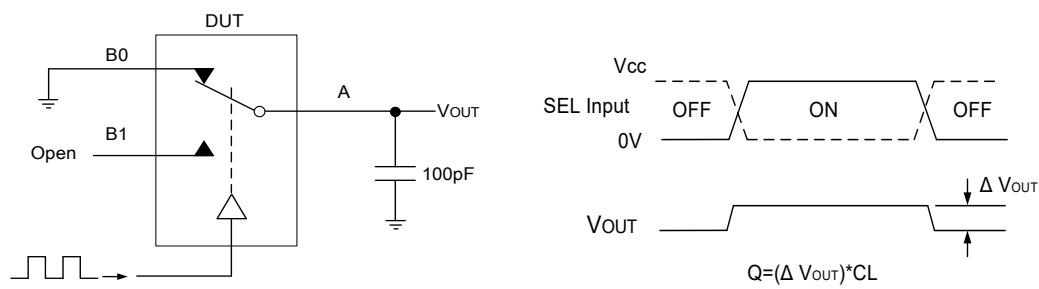


Figure 3. Charge Injection Test

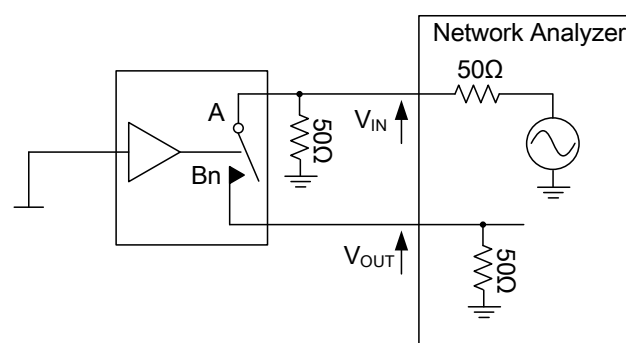


Figure 4. Off Isolation

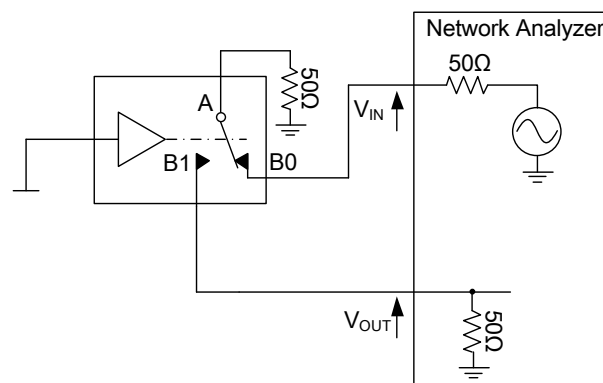


Figure 5. Crosstalk

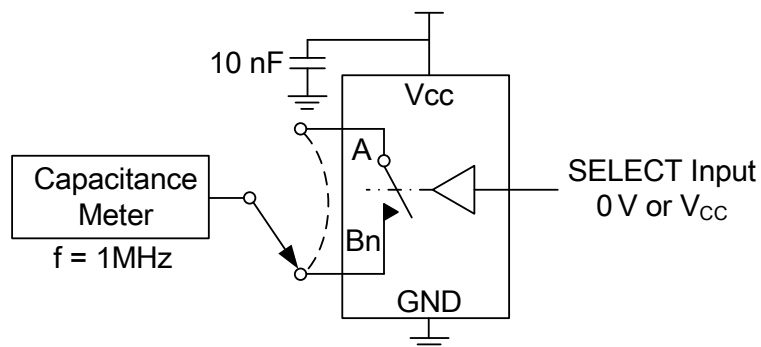


Figure 6. Channel Off Capacitance

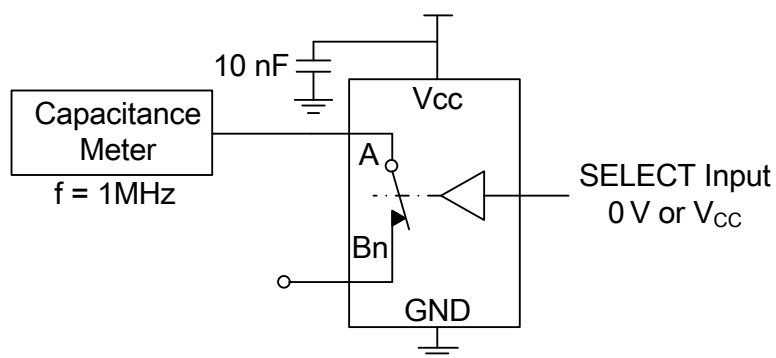


Figure 7. Channel On Capacitance

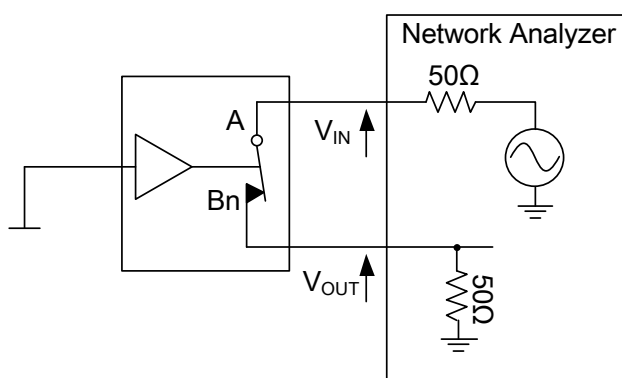
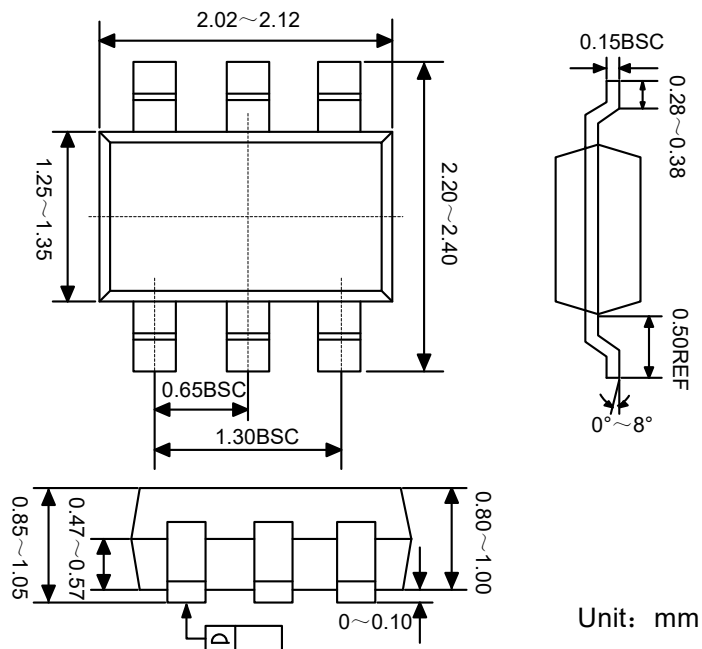


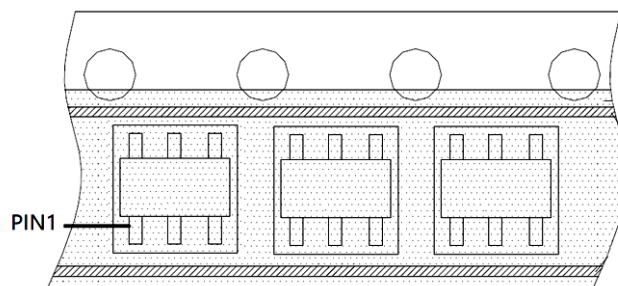
Figure 8. Bandwidth

Package Dimension

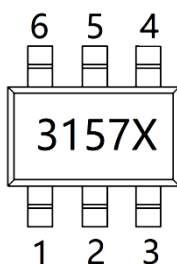
SC70-6



Tape (SC70-6)



Marking



3157: Part Number
X: Tracking Number

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