3.5Ω Single Bilateral SPST Analog Switch

Features

- Wide Power Supply Range: 1.8V to 5.5V
- High Bandwidth: 350MHz
- On-Resistance: 3.5Ω (typ) at 5.0V
- High Speed, Typically 29ns
- Rail-to-Rail Signal Range
- Operation Temperature Range: -40℃ to 125℃
- Lead (Pb) Free SC70-5 Package

Applications

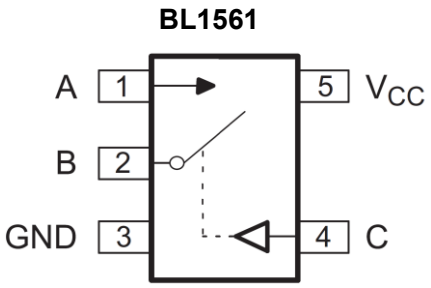
- Wireless Handsets
- Portable Electronic Devices
- Wearable Devices
- Audio and Video Signal Routing
- Portable Computing

Description

The BL1561 is a bidirectional 1-channel single-pole single-throw (SPST) analog switch, which is designed to operate from 1.8V to 5.5V. The BL1561 can handle both analog and digital signals. It features bandwidth (350MHz) and low on-resistance (3.5Ω TYP).

The BL1561 is available in SC70-5 package.

Block Diagram



Function Table

Control Input (C)	Switch
H	ON
L	OFF

Pin Description

Pin Name	Type	Description
VCC	PWR	Power Supply
GND	Ground	Ground
A	Input/Output	Bidirectional signal to be switched
B	Input/Output	Bidirectional signal to be switched
C	Input	Logic Control Signal

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Units
DC Supply Voltage	V_{CC}	-0.3	6	V
DC Switch Voltage	V_A /V_B	-0.3	V_{CC} + 0.3	V
DC Input Voltage	V_{IN}	-0.3	V_{CC} + 0.3	V
Continuous Current	$I_{(A/B)}$	-120	+120	mA
Peak Current(1)	$I_{PEAK(A/B)}$	-200	+200	mA
Storage Temperature Range	T_{STG}	-65	150	℃

Notes:

(1) Pulsed at 1ms, 50% duty circle

(2) Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(3) Control input must be held HIGH or LOW, and mustn’t be floated.

RECOMMENDED OPERATING CONDITIONS

DC Supply Voltage (V_{CC}) ……1.8V to 5.5V

Switch Input Voltage ……...0V to V_{CC}

Control Input Voltage …… 0V to V_{CC}

Operation Temperature (TA)……-40℃ to +125℃

ORDERING INFORMATION

Part No.	Package	Packing	Operation Temp.
BL1561	SC70-5	Tape and Reel, 3000	-40°C to +125°C

DC ELECTRICAL CHARACTERISTICS @ +5.0V Supply

Parameter	Symbol	Conditions	Guaranteed Limit			Unit
			Min.	Typ.(1)	Max.	
Analog Switch						
Analog Signal Range	V_A/V_B		0		V_{CC}	V
On-Resistance	R_{ON}	V_{CC} = 5.0V; I_B =-10mA ; V_A=3.5V		3.5		Ω
On-Resistance Flatness(2)	$R_{FLAT(ON)}$	V_{CC} = 5.0V; I_B =-10mA ; V_A=0~V_{CC}		1.2		Ω
Off Leakage Current	$I_{OFF(A)}$	V_{CC} = 5.5V; V_A = 3.3V/0.3V; V_B = 0.3V/3.3V		0.01	1	uA
On Leakage Current	$I_{ON(A)}$, $I_{ON(B)}$	V_{CC} = 5.5V; V_B = 0.3V/3.3V; V_A = 0.3V/ 3.3V, or floating		0.01	1	uA
Digital I/O						
Input Voltage High	V_{IH}	Minimum High Level Input Voltage	1.7			V
Input Voltage Low	V_{IL}	Maximum Low Level Input Voltage			0.6	V
Input Leakage Current	I_{IN}	V_{IN} = 0 or V_{CC}		0.01	1	uA

Note:

(1) Typical characteristics are at +25°C

(2) Flatness is defined as the difference between the maximum and minimum value of on resistance as measured over the specified analog signal ranges.

DYNAMIC CHARACTERISTICS @ +5V Supply

Parameter	Symbol	Conditions		Guaranteed Limit			Unit
				Min.	Typ. (1)	Max.	
AC ELECTRICAL CHARACTERISTICS							
Turn-On Time	t_{ON}	V_{CC} = 5.0V; V_A = 3.0V, R_L = 50Ω; C_L = 35pF, V_{IH}=1.7V,V_{IL}=0V			29		ns
Turn-Off Time	t_{OFF}	V_{CC} = 5.0V; V_A = 3.0V, R_L = 50Ω; C_L = 35pF, V_{IH}=1.7V,V_{IL}=0V			22		ns
OFF Capacitance	$C_{OFF(A)}$	f = 1MHz			6		pF
ON Capacitance	$C_{ON(A)}$, $C_{ON(B)}$	f = 1MHz			18		pF
ADDITIONAL APPLICATION CHARACTERISTICS							
3dB Bandwidth	f_{3dB}	Signal = 0dBm, R_L = 50Ω, C_L = 5pF			350		MHz
Off Isolation	V_{Iso}	R_L = 50Ω, C_L = 5pF, Signal = 0dBm	f = 1MHz		-70		dB
			f =10MHz		-50		dB

Note:

(1) Typical characteristics are at +25°C

DC ELECTRICAL CHARACTERISTICS @ +2.7V Supply

Parameter	Symbol	Conditions	Guaranteed Limit			Unit
			Min.	Typ.(1)	Max.	
Analog Switch						
Analog Signal Range	V_A/V_B		0		V_{CC}	V
On-Resistance	R_{ON}	V_{CC} = 2.7V; I_B =-10mA ; V_A=1.5V		8.8		Ω
On-Resistance Flatness(2)	R_{FLAT}	V_{CC} = 2.7V; I_B =-10mA ; V_A=0~V_{CC}		4.5		Ω
Off Leakage Current	$I_{OFF(A)}$	V_{CC} = 3.6V; V_A= 0.3V, 3.3V; V_B = 3.3V, 0.3 V		0.01	1	uA
On Leakage Current	$I_{ON(A)}$, $I_{ON(B)}$	V_{CC} = 3.6V; V_B = 0.3V, 3.3 V ; V_A = 0.3V, 3.3V; or floating		0.01	1	uA
Digital I/O						
Input Voltage High	V_{IH}	Minimum High Level Input Voltage	1.5			V
Input Voltage Low	V_{IL}	Maximum Low Level Input Voltage			0.5	V
Input Leakage Current	I_{IN}	V_{IN} = 0 or V_{CC}		0.01	1	uA

Note:

(1) Typical characteristics are at +25°C

(2) Flatness is defined as the difference between the maximum and minimum value of on resistance as measured over the specified analog signal ranges.

DYNAMIC CHARACTERISTICS @ +2.7V Supply

Parameter	Symbol	Conditions		Guaranteed Limit			Unit
				Min.	Typ. (1)	Max.	
AC ELECTRICAL CHARACTERISTICS							
Turn-On Time	t_{ON}	V_{CC} = 2.7V; V_A = 1.5V, R_L = 50Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V			39		ns
Turn-Off Time	t_{OFF}	V_{CC} = 2.7V; V_A = 1.5V, R_L = 50Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V			35		ns
OFF Capacitance	$C_{OFF(A)}$	f = 1MHz			6		pF
ON Capacitance	$C_{ON(A)}$ $C_{ON(B)}$	f = 1MHz			18		pF
ADDITIONAL APPLICATION CHARACTERISTICS							
3dB Bandwidth	f_{3dB}	Signal = 0dBm, R_L = 50Ω, C_L = 5pF			350		MHz
Off Isolation	V_{Iso}	R_L = 50Ω, C_L = 5pF, Signal = 0dBm	f = 1MHz		-70		dB
			f =10MHz		-50		dB

Note:

(1) Typical characteristics are at +25°C

TEST SETUP CIRCUITS

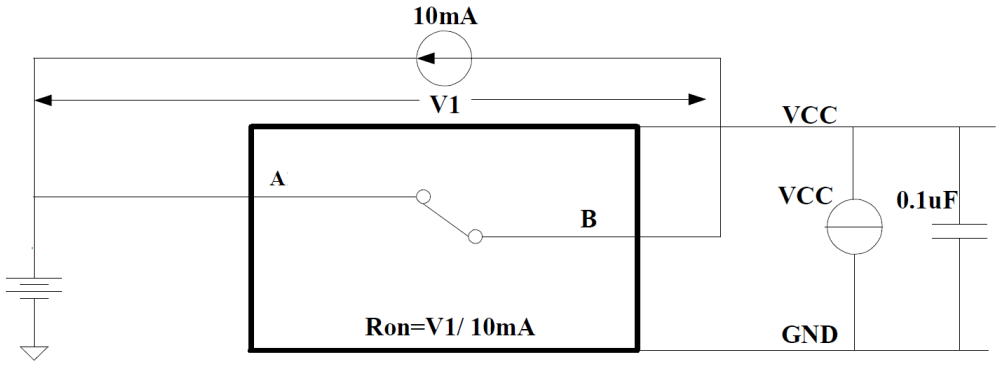


Figure1. Test Circuit for On Resister

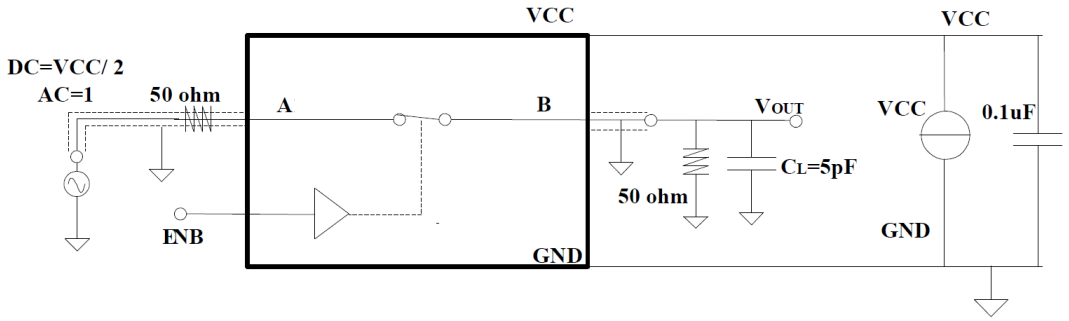


Figure2. Test Circuit for Bandwidth

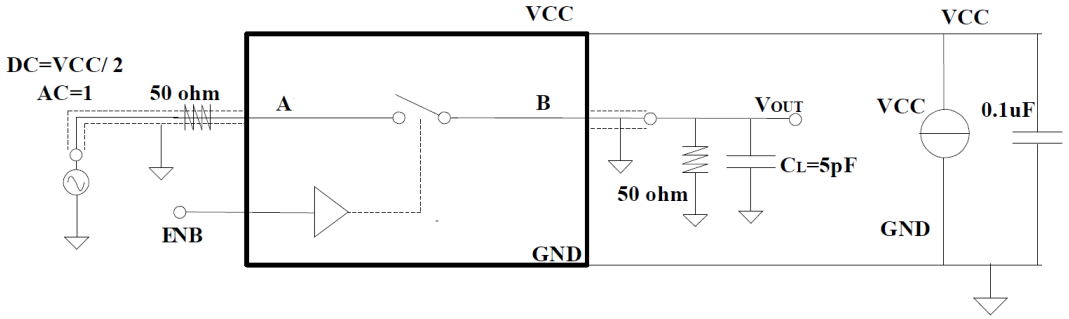
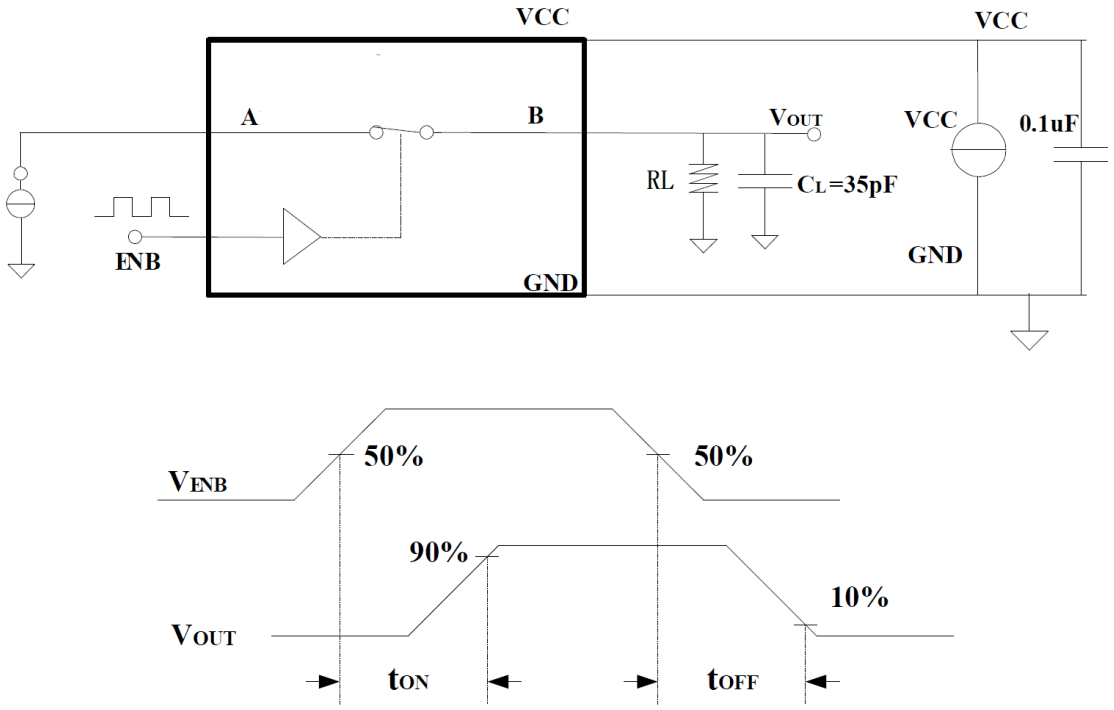


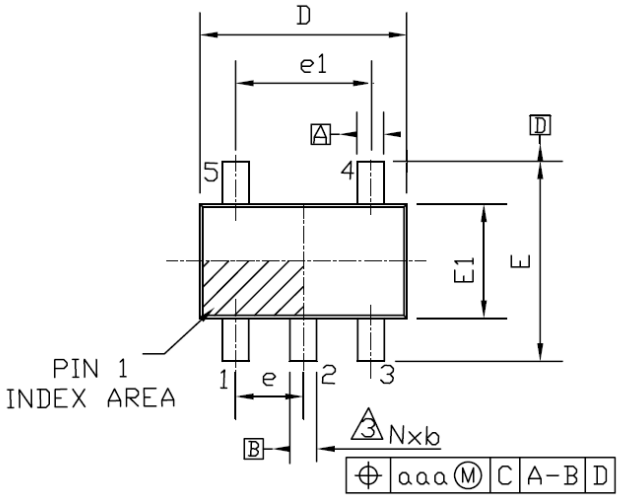
Figure3. Test Circuit for Off Isolation

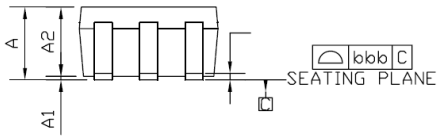


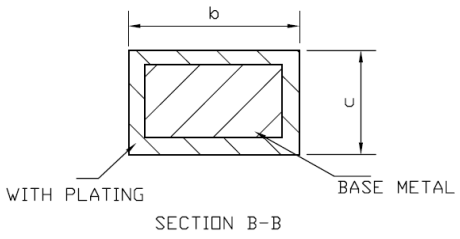
Test Circuit 4. Test Circuit for Switch Times

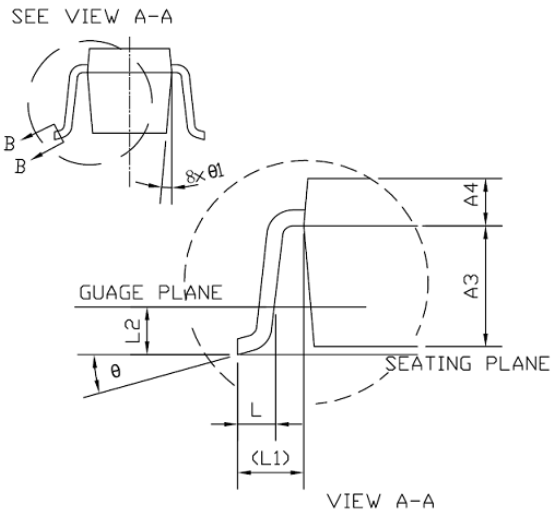
PACKAGE OUTLINE DIMENSIONS

SC70-5









COMMON DIMENSION			
SYMBOL	IN MILLIMETERS		
	MIN	NOMAL	MAX
A	0.80	–	1.10
A1	0	–	0.10
A2	0.80	0.90	1.00
A3	0.47	0.52	0.57
A4	0.33	0.38	0.43
b	0.15	–	0.30
c	0.10	–	0.25
D	1.85	2.00	2.20
e	0.65 BSC		
e1	1.30 BSC		
E	1.80	2.10	2.40
E1	1.15	1.25	1.35
L	0.10	–	0.45
L1	0.42 REF.		
L2	0.20 BSC		
θ	0°	4°	30°
θ1	4°	–	12°
aaa	0.10		
bbb	0.10		