Single-Channel, 5th Order, Standard Definition Video Filter Driver BL1511B

Description

The BL1511B is a low-Voltage, single-channel video amplifier with integrated reconstruction filter and input clamps. Specially suited for standard definition video signals, this device is ideal for a wide range of television and set-top box applications.

BL1511B offers 6dB Gain rail-to-rail output driver and 5th order output reconstruction filter. It has 8MHz -3dB bandwidth and 31.25V/μs slew rate. BL1511B provides improved image quality compared with passive LC filters and discrete drivers solution.

BL1511B can be DC-coupled or AC-coupled with input video signal, such as the output stage of DAC to eliminate out-of-band noise. The output in BL1511B can be configured as DC or AC-coupled output.

The BL1511B is available in SC70-5(SOT-353) and SOP8 packages. It operates over an ambient temperature range of -40℃ to +85℃.

Features

- Operation Temperature Range: -40℃ to 85℃
- Single channel 5th Order 8MHz (SD) Filters
- Transparent Input Clamping
- 6dB Output Driver Gain
- Rail-to-Rail Output
- Input Voltage Range Includes Ground
- AC or DC Coupled Inputs / Outputs
- Operates from 3.3V to 5.5V Power Supply
- SC70-5(SOT-353) and SOP8 Packages
- ESD: pass 8kV HBM test

Applications

Cable and Satellite Set-Top Boxes

Video Amplifiers

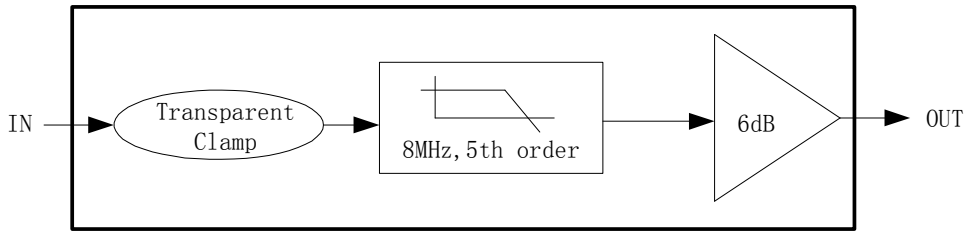
Communications Devices

Portable and Handheld Products

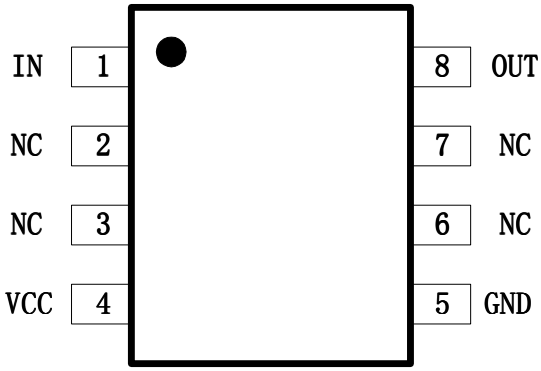
Personal Video Recorders

Video on Demand, DVD Players

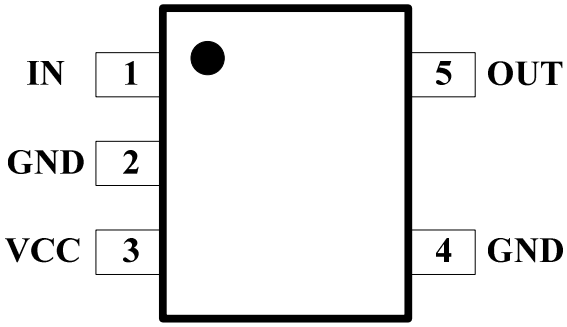
Block Diagram



Pin Configuration



SOP8L



SC70-5(SOT353)

SOP8 Pin Description

No.	Pin Name	Description	I/O
1	IN	Signal Input	Input
4	VCC	The power pad of the chip	Power
5	GND	The ground pad of the chip	Ground
8	OUT	Signal Output	Output
2, 3, 6, 7	NC	No Connect	

SOT353 Pin Description

No.	Pin Name	Description	I/O
1	IN	Signal Input	Input
3	VCC	The power pad of the chip	Power
2, 4	GND	The ground pad of the chip	Ground
5	OUT	Signal Output	Output

ABSOLUTE MAXIMUM RATINGS

Parameter	Min	Max	Units
Supply Voltage VCC to GND	-0.3	6	V
Input Voltage	GND-0.3	VCC+ 0.3	V
Storage Temperature Range	-65	150	℃
Work Temperature Range	-40	85	℃
Operating Temperature Range T_A	-40	85	℃

Notes:

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.

ORDERING INFORMATION

MODEL	PIN- PACKAGE	SPECIFIED TEMPERATURE RANGE	PACKAGE MARKING	PACKAGE OPTION
BL1511BSO	SOP8	- 40°C to +85°C	BL1511B YWWSSSS (1)	Tape and Reel, 2500
BL1511BST	SOT353	- 40°C to +85°C	DSSS (2)	Tape and Reel, 3000

WHERE(1):

"BL1511B" IS PRODUCTION ID COLOUR: LASER MARKING SIZE: 2 POINT.

"Y"stands for the last number of the product year, for example, "2" stands for the year 2012.

"WW" stands for the product week.

"SSSS" stands for the fifth to the eighth number of the lot num.

WHERE(2):

"D" IS PRODUCTION ID COLOUR: LASER MARKING SIZE: 2 POINT.

"SSS" stands for the fourth to the sixth number of the lot num.

ELECTRICAL CHARACTERISTICS

(At VCC=5V, R_L = 150Ω connected to GND, V_{IN} = 1Vpp, and C_{IN} = 0.1μF, all outputs AC coupled with 220μF, referenced to 400kHz, unless otherwise noted)

DC ELECTRICAL CHARACTERISTICS						
PARAMETER	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
Iq	V_{IN}=0.5V	+25℃		7	9.5	mA
		-40 to +85℃			11	
V_{OLS}	V_{IN}=0V, NO LOAD	+25℃		395	580	mV
		-40 to +85℃			670	
Input Voltage Vclamp (V_{clamp})	I_{IN}=-3.5mA	+25℃	-180	-90		mV
		-40 to +85℃	-261			
Clamp Charge Current	V_{IN}=Vclamp-100mV	+25℃	-6	-5.1		mA
		-40 to +85℃	-6.6			
Clamp Discharge Current	V_{IN}=500mV	+25℃		0.6	3	μA
		-40 to +85℃			3.2	
PSRR	DC	+25℃	45	56		dB
		-40 to +85℃	44			
Output Voltage High Swing	V_{IN}=3V, R_L = 150Ω connected to GND	+25℃	4.6	4.8		V
		-40 to +85℃	4.55			

AC ELECTRICAL CHARACTERISTICS						
PARAMETER	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
GAIN (A_V)	R_L = 150Ω to GND	+25℃	5.6	6	6.4	dB
		-40 to +85℃	5.4		6.5	
BW (-0.1dB)	R_L = 150Ω to GND	+25℃		6		MHz
BW (-3dB)	R_L = 150Ω to GND	+25℃		8		MHz
Filter response	f_{IN}=27MHz	+25℃		48		dB
SLEW RATE	2V outputstep 80% to 20%	+25℃		31.25		V/uS
Fall time	2V outputstep 80% to 20%	+25℃		38.4		nS
Rise time	2V outputstep 80% to 20%	+25℃		38.4		nS
D/DT	difference from 400KHz to 6.5MHz	+25℃		31		nS
DG	PAL DC coupled	+25℃		0.6		%
	PAL AC coupled	+25℃		0.88		
DP	PAL DC coupled	+25℃		0.88		°
	PAL AC coupled	+25℃		1.6		

Typical Application Diagram

The following schematic in Figure 2 is normally used for AC coupled output and DC-coupled input with DAC which has an output voltage range of 0V to 1.4V. AC coupled output offer slightly lower power dissipation and high ESD protection ability. The schematic in Figure 1 is also popular in design.

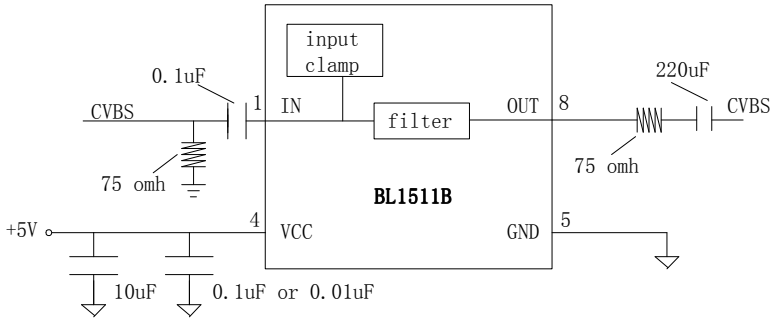


Figure 1 AC Coupling Application Schematic

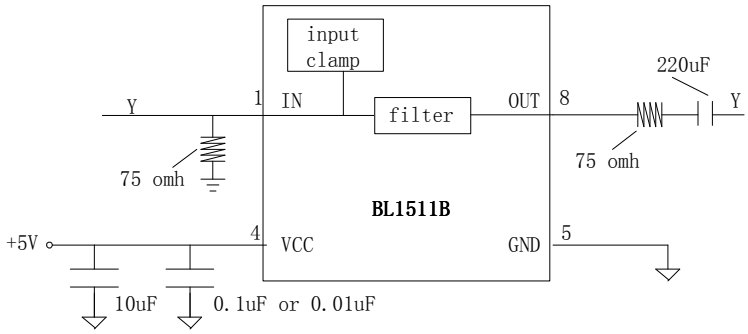


Figure 2 Input DC Coupling Output AC Coupling

APPLICATION NOTE

Functional Description

BL1511B operates from a single 3.3V to 5V supply. In application, BL1511B is a fully integrated solution for filtering and buffering SDTV signals in front of video decoder or behind video encoder. For example, BL1511B can replace one passive LC filter and one amplifier driver at CVBS and S-video output side in set-top box and DVD player, this solution can help you save PCB size and production cost, it also improves video signal performance comparing with traditional design using discrete components. BL1511B features a DC-coupled input buffer, 5-pole low-pass filter to eliminate out-of-band noise of video encoder, and a gain of +6dB in the output amplifier to drive 75Ω load. The AC or DC-coupled input buffer eliminates sync crush, droop, and field tilt. The output of BL1511B also can be DC-coupled or AC-coupled.

Input Considerations

Besides AC coupling, the BL1511B inputs also can be DC-coupled. In DC coupling application, No input coupling capacitors are needed because the amplitude of input video signal from DAC includes ground and extends up to 1.4V, then BL1511B can be directly connected to the output of a single-supply, current-output DAC without any external bias network. Some time, if DAC's output level exceeds the range of 0V to 1.4V, or BL1511B is driven by an unknown external source or a SCART switch which has its own clamping circuit, AC coupling is needed in such applications.

Output Considerations

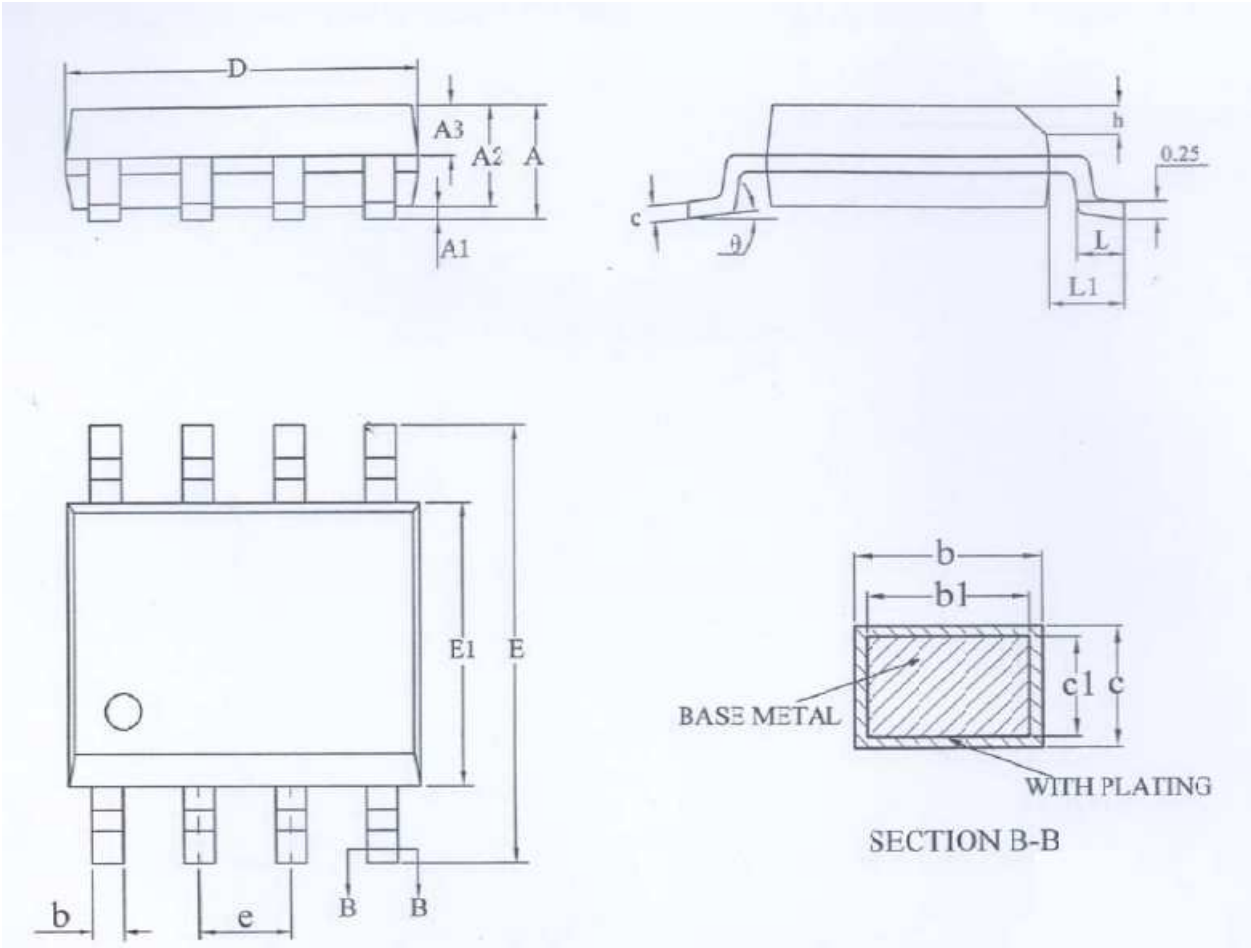
The BL1511B outputs can be DC-coupled or AC-coupled. When 0V is input, the BL1511B output voltage is 395mV typically. In DC coupling design, one 75Ω resistor is used to connect BL1511B's output pin with external load directly, this serial back-termination resistor is used to match the impedance of the transmission line between BL1511B and external load to cancel the signal reflection. The BL1511B outputs can sink and source current allowing the device to be AC-coupled with external load, in AC coupling, 220μF at least capacitor will be used in order to eliminate field tilt.

Power-Supply Bypassing and Layout

Correct power supply bypassing is very important for optimizing video performance in design. One 0.1μF and one 10μF capacitors are always used to Bypass VCC pin of BL1511B, please place these two capacitors as close to the BL1511B output pin as possible, a large ground plane is also needed to ensure optimum performance. The input and output termination resistors should be placed as close to the related pin of BL1511B as possible to avoid performance degradation. The PCB traces at the output side should have 75Ω characteristic impedance in order to match the 75Ω characteristic impedance cable connecting external load. In design, please keep the board trace at the inputs and outputs of the BL1511B as short as possible to minimize the parasitic stray capacitance and noise pickup.

PACKAGE OUTLINE DIMENSIONS

SOP8L



SYMBOL	MILLIMETER		MILLIMETER
	MIN.	NOM	MAX.
A	-	-	1.75
A1	0.10	-	0.23
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	-	0.48
b1	0.38	0.41	0.44
c	0.21	-	0.26
c1	0.19	0.20	0.21
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		1.27BSC
h	0.25	-	0.50
L	0.50	-	0.80
L1	1.05BSC		1.05BSC
θ	0°	-	8°

SC70-5(SOT-353)

