



DESCRIPTION

The A4781 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.

A4781 offers 6dB Gain rail-to-rail output driver and 5th order output reconstruction filter. It has 8MHz -3dB bandwidth and 31.25V/ μ s slew rate. A4781 provides improved image quality compared with passive LC filters and discrete drivers solution.

A4781 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 A4781 can be configured as DC or AC-coupled output. It operates over an ambient temperature range of -40°C to +85°C.

The A4781 is available in SC70-5 package.

ORDERING INFORMATION

Package Type	Part Number	
SC70-5	C5	A4781C5R A4781C5VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products Suffix " V " means Halogen free Package		

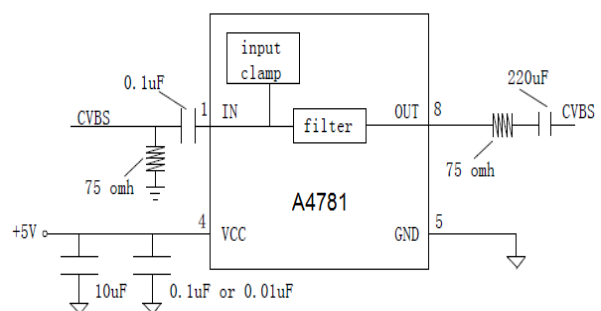
FEATURES

- Operation Temperature Range: -40°C to 85°C
- 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
- ESD: pass 8kV HBM test
- Available in SC70-5 Package

APPLICATION

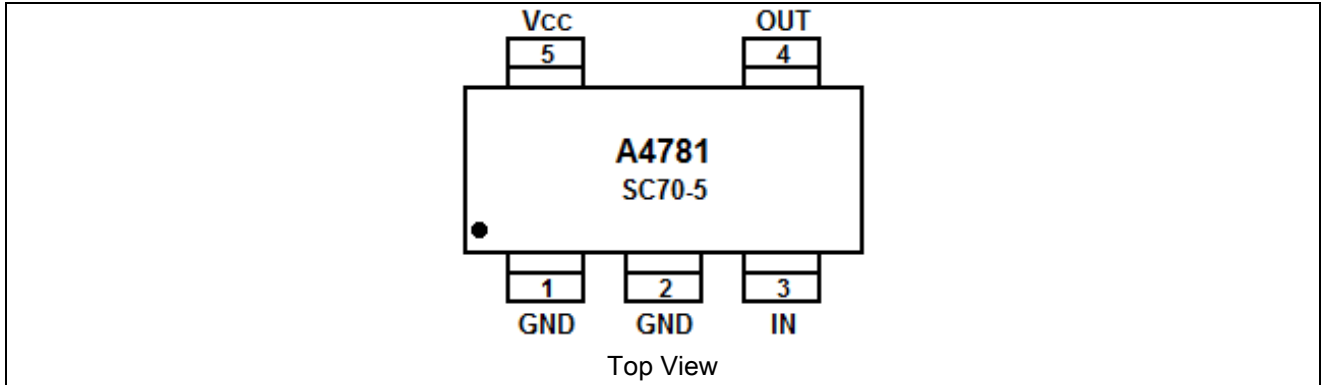
- Cable and Satellite Set-Top Boxes,
- Video Amplifiers
- Communications Devices
- Portable and Handheld Products
- Personal Video Recorders
- Video on Demand, DVD Players

TYPICAL APPLICATION





PIN DESCRIPTION



Pin #	Symbol	I/O	Function
SC70-5			
1,2	GND	Ground	The ground pad of the chip
3	IN	Input	Signal Input
4	OUT	Output	Signal Output
5	V _{cc}	Power	The power pad of the chip



ABSOLUTE MAXIMUM RATINGS

Supply Voltage V_{CC} to GND	-0.3V to 6V
Input Voltage	GND-0.3V~ V_{CC} +0.3V
Storage Temperature Range	-65°C~150°C
Work Temperature Range	-40°C~85°C
T_A , Operating Temperature Range	-40°C~85°C

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.



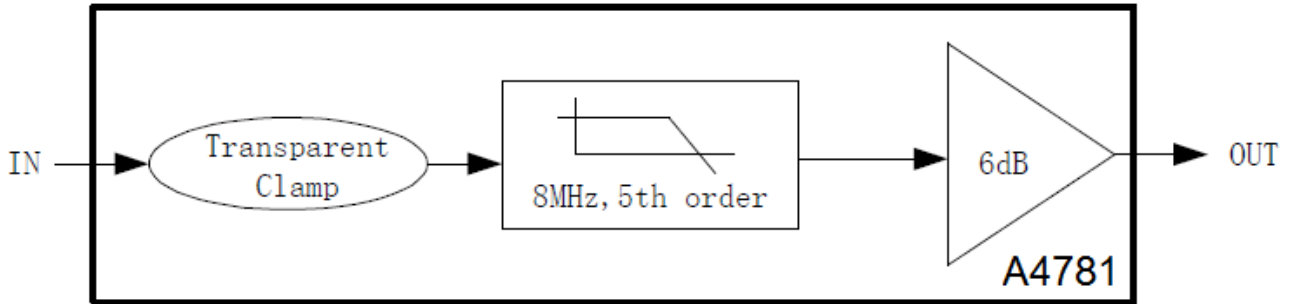
ELECTRICAL CHARACTERISTICS

At $V_{CC}=5V$, $R_L=150\Omega$ connected to GND, $V_{IN}=1V_{pp}$, and $C_{IN}=0.1\mu F$, all outputs AC coupled with $220\mu F$, referenced to 400kHz, unless otherwise noted

Parameter	Conditions	Min.	Typ.	Max.	Unit	
DC ELECTRICAL CHARACTERISTICS						
I_Q	$V_{IN}=0.5V$	+25°C		7	9.5	mA
		-40 to +85°C			11	
V_{OLS}	$V_{IN}=0V$, No Load	+25°C		395	580	mV
		-40 to +85°C			670	
Input Voltage V_{CLAMP} (V_{CLAMP})	$I_{IN}=-3.5mA$	+25°C	-180	-90		mV
		-40 to +85°C	-261			
Clamp Charge Current	$V_{IN}=V_{CLAMP}-100mV$	+25°C	-6	-5.1		mA
		-40 to +85°C	-6.6			
Clamp Discharge Current	$V_{IN}=500mV$	+25°C		0.6	3	μA
		-40 to +85°C			3.2	
PSRR	DC	+25°C	45	56		dB
		-40 to +85°C	44			
Output Voltage High Swing	$V_{IN}=3V$, $R_L=150\Omega$ connected to GND	+25°C	4.6	4.8		V
		-40 to +85°C	4.55			
AC ELECTRICAL CHARACTERISTICS						
GAIN (A_V)	$R_L=150\Omega$ to GND	+25°C	5.6	6	6.4	dB
		-40 to +85°C	5.4		6.5	
BW (-0.1dB)	$R_L=150\Omega$ to GND	+25°C		6		MHz
BW (-3dB)	$R_L=150\Omega$ to GND	+25°C		8		MHz
Filter Response	$f_{IN}=27MHz$	+25°C		48		dB
SLEW RATE	2V outputstep 80% to 20%	+25°C		31.25		V/ μS
Fall time	2V outputstep 80% to 20%	+25°C		38.4		nS
Rise time	2V outputstep 80% to 20%	+25°C		38.4		nS
D/DT	difference from 400KHz to 6.5MHz	+25°C		31		nS
DG	PAL DC coupled	+25°C		0.6		%
	PAL AC coupled	+25°C		0.88		
DP	PAL DC coupled	+25°C		0.88		%
	PAL AC coupled	+25°C		1.6		



BLOCK DIAGRAM





DETAILED INFORMATION

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.

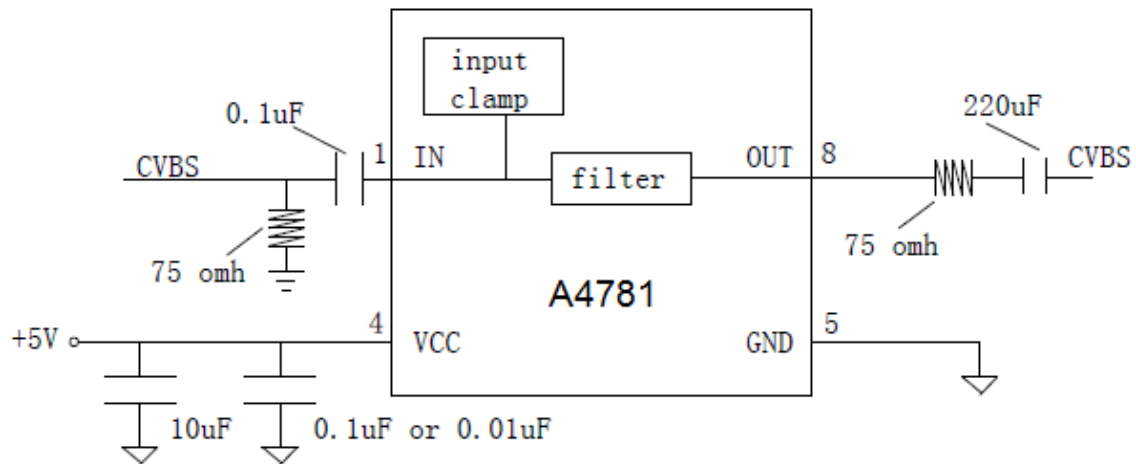


Figure 1. AC Coupling Application Schematic

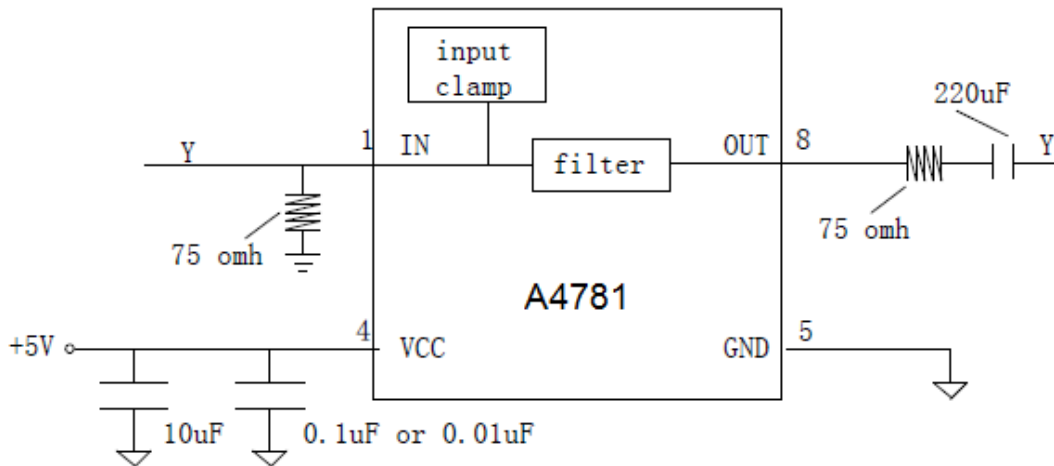


Figure 2. Input DC Coupling Output AC Coupling



Application Note

Functional Description

A4781 operates from a single 3.3V to 5V supply. In application, A4781 is a fully integrated solution for filtering and buffering SDTV signals in front of video decoder or behind video encoder. For example, A4781 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.

A4781 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 A4781 also can be DC-coupled or AC-coupled.

Input Considerations

Besides AC coupling, the A4781 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 A4781 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 A4781 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 A4781 outputs can be DC-coupled or AC-coupled. When 0V is input, the A4781 output voltage is 395mV typically. In DC coupling design, one 75Ω resistor is used to connect A4781's output pin with external load directly, this serial back-termination resistor is used to match the impedance of the transmission line between A4781 and external load to cancel the signal reflection. The A4781 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.

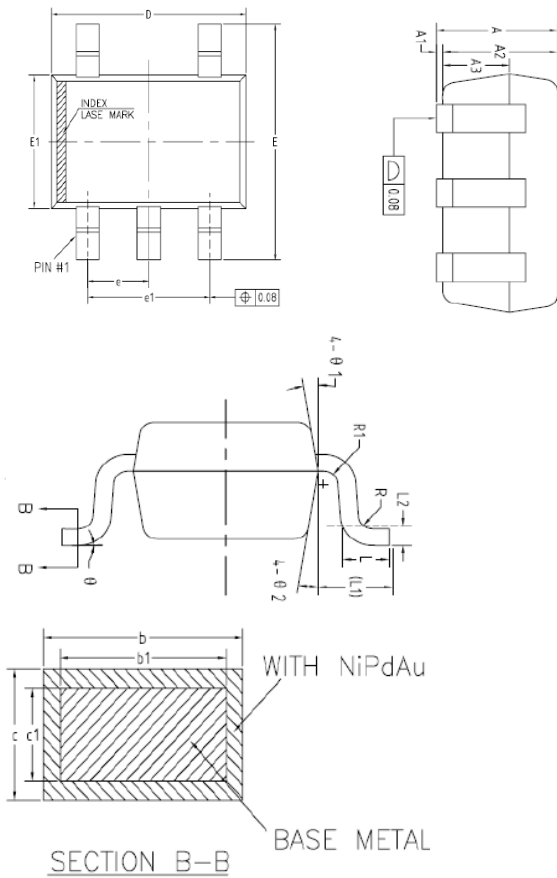
Power-Supply Bypassing and Layout

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 V_{CC} pin of A4781, please place these two capacitors as close to the A4781 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 A4781 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 A4781 as short as possible to minimize the parasitic stray capacitance and noise pickup.



PACKAGE INFORMATION

Dimension in SC70-5 (Unit: mm)



Symbol	Min	Max
A	0.85	1.05
A1	0.00	0.10
A2	0.80	1.00
A3	0.47	0.57
b	0.22	0.29
b1	0.22	0.28
c	0.115	0.15
c1	0.115	0.14
D	2.02	2.12
E	2.20	2.40
E1	1.25	1.35
e	0.65BSC	
e1	1.30BSC	
L	0.28	0.38
L1	0.50REF	
L2	0.15BSC	
R	0.10	-
R1	0.10	0.25
θ	0°	8°
θ1	6°	12°
θ2	6°	12°



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