

## SIX-CHANNEL AUDIO AMPLIFIER

### DESCRIPTION

SD7401RC/SD7401SM is a 6-channel audio amplifier with built-in microphone input amplifier. High quality audio output is available through simple peripheral circuit and the amplifier gain can be adjusted flexibly by external resistor. Its audio output signal-noise ratio is 100dB, total harmonic distortion is 0.03% and the channel separation is 84dB.

Based on BICMOS technology, SD7401RC/SD7401SM can stably work in +5V/-12V system with built-in voltage regulator. The built-in filter can improve the audio quality by attenuating the other signals. The mute and ON/OFF POP suppression functions can suppress the POP noise in the input signal.

It is widely used as pre-amplification in various stereo and 5.1-channel audio systems to pre-amplify the signal from the main chip audio.

### FEATURES

- \* BICMOS technology
- \* Dual power supply (+5V/-12V)
- \* Built-in voltage regulator
- \* Low distortion
- \* Standby function
- \* Mute function and ON/OFF POP noise suppression



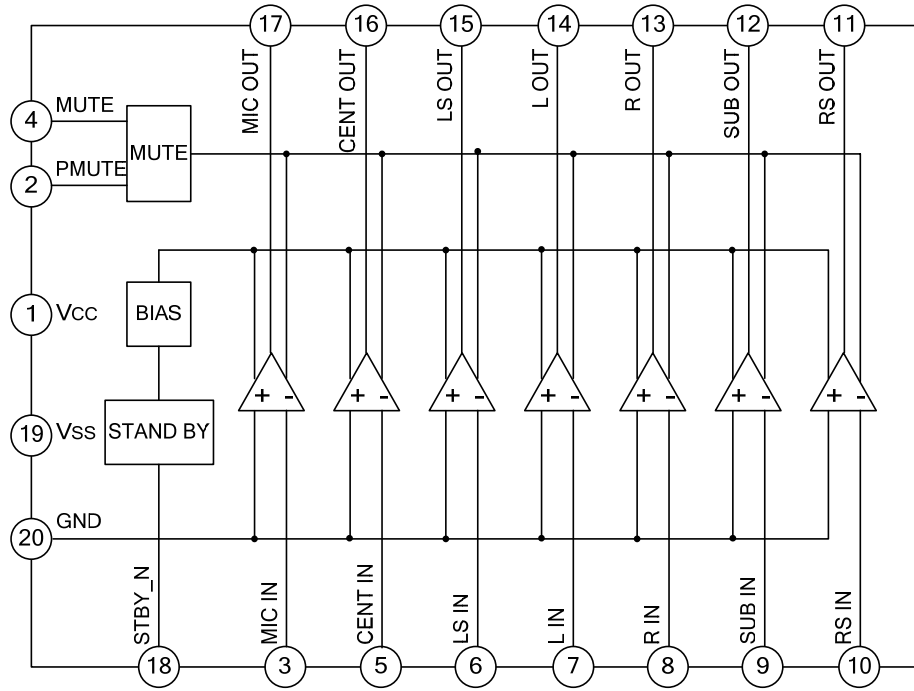
### APPLICATIONS

- \* CD/VCD/DVD
- \* Other audio systems

### ORDERING INFORMATION

Part No.	Package	Marking	Material	Package Type
SD7401RC	SSOP-20-225-0.65	SD7401RC	Pb free	Tube
SD7401RCTR	SSOP-20-225-0.65	SD7401RC	Pb free	Tape&Reel
SD7401SM	SOP-20-300-1.27	SD7401SM	Pb free	Tube
SD7401SMTR	SOP-20-300-1.27	SD7401SM	Pb free	Tape&Reel

**BLOCK DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

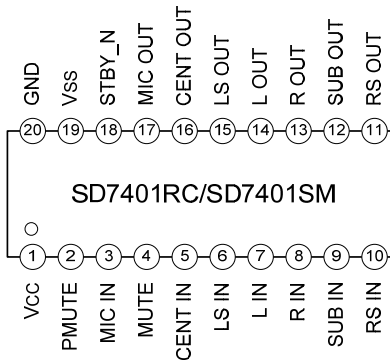
Characteristics	Symbol	Rating	Unit
Supply Voltage (Vcc/Vss)	Vcc/Vss	+6/-- <sup>1</sup>	V
Operating Temperature	T <sub>opr</sub>	-20~85	°C
Storage Temperature	T <sub>stg</sub>	-40~125	°C

Note 1: Tolerable voltage is decided by external resistor because of built-in voltage regulator at negative power supply.

**ELECTRICAL CHARACTERISTIC** (Unless otherwise specified, VCC = 5V, VSS = -12V, RL = 10kΩ, Tamb = 25°C, f = 1kHz)

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating Voltage	VCC		--	5	--	V
	VSS		--	-12	--	V
Operating Current	ICC		--	3	5	mA
	ISS	External resistor 470Ω at negative power supply	--	14.8	16	mA
Standby Current	ISTBY	STBY_N connect toVSS	--	600	800	μA
Max. Output Voltage	Vomax	THD=0.1%	2.3	2.5	--	Vrms
Audio Amplitude Response Change		20Hz~20kHz, Vo=2Vrms	--	--	1	dB
Voltage Gain	G	No input resistor, THD=0.1%	--	11.8	--	dB
Total Harmonic Distortion	THD	Vo=2Vrms	--	0.01	0.03	%
Signal-Noise Ratio	SNR	Vo=2Vrms	90	100	--	dB
Dynamic Range	DR	-60dB	80	89	--	dB
Mute Restrain	MR	Vo=2Vrms	80	90	--	dB
Channel Separation	CT	Vo=2Vrms	80	84	--	dB
Channel Balance	CB	Vo=2Vrms	--	--	0.2	dB
Input Impedance	Ri		--	26	--	kΩ

**PIN CONFIGURATION**

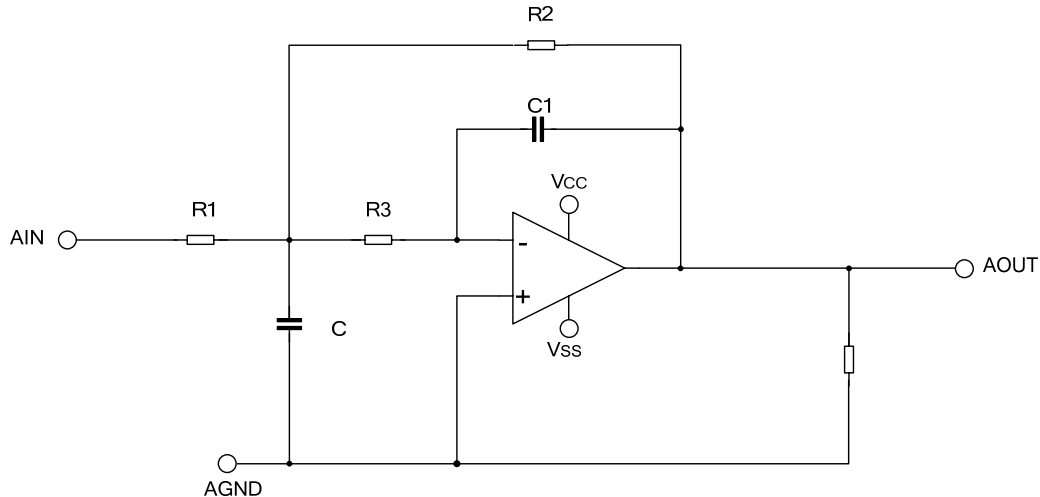


**PIN DESCRIPTION**

Pin No.	Pin Name	I/O	Pin Description
1	VCC	--	Positive power supply
2	PMUTE	I/O	POP restrain control
3	MIC IN	I	Microphone input
4	MUTE	I	Mute control
5	CENT IN	I	central channel input
6	LS IN	I	left-surround channel input
7	L IN	I	Left channel input
8	R IN	I	Right channel input
9	SUB IN	I	Subwoofer input
10	RS IN	I	right-surround channel input
11	RS OUT	O	right-surround channel output
12	SUB OUT	O	Subwoofer output
13	R OUT	O	Right channel output
14	L OUT	O	Left channel output
15	LS OUT	O	left-surround channel output
16	CENT OUT	O	central channel output
17	MIC OUT	O	Microphone output
18	STBY_N	I	Standby control
19	Vss	--	Negative power supply
20	GND	--	Ground

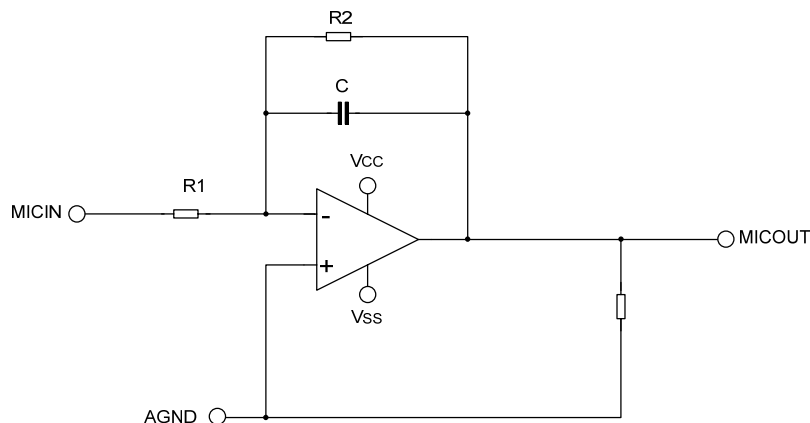
## FUNCTION DESCRIPTION

### 1. Channel amplifier



The second-order filter structure shown as above is adopted for 6-channel audio amplifier, with in-band gain of about 12dB and -3dB bandwidth of 40kHz above which is well meet audio requirements. As principle structure, in-band gain is decided by:  $G = -\frac{R_2}{R_1}$ , thus, gain can be adjusted by changing R1.

### 2. Microphone amplifier



The proportional amplifier shown as above is adopted for microphone amplifier with setting gain of about 29dB, and capacitor C is used for high frequency signal filtering. As described above, the gain can be also adjusted by changing R1.

### 3. Mute & ON/OFF POP noise control

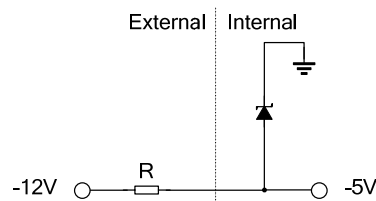
Mute control pin (pin 4) controls 6-channel as mute by internal switches. It comes to mute mode when pin 4 is connected to Vcc (high level) and comes to normal mode when connected to ground.

Pin 2 is used for POP noise restrain by connecting an external capacitor which can be increased appropriately

for better POP noises restrain effect. In general, POP noise restrain is realized by mute control. Mute pulse is generated when turned on for zero output and ended after powered on for normal output; mute pulse is also generated when power supply is threshold value below during turned off for zero output. Thus, pop noise is restrained during power on/down.

#### 4. Power supply

The built-in voltage regulator for negative power supply is shown as below. An external resistor R guarantees voltage stability near -5V on pin 19 and the chip power supply is  $\pm 5V$  for normal operation. Because the negative power to provide current is decided by this resistance, if the system output is light load, this resistance can be properly increased to reduce operate current, but the voltage of pin 19 must be maintained and can not drop significantly.

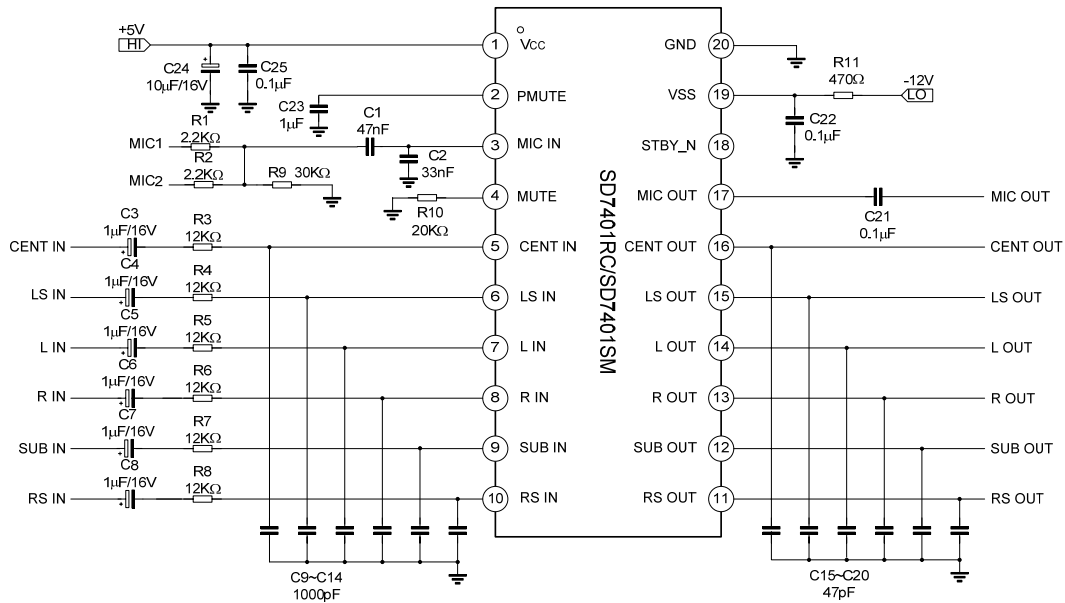


#### 5. System standby

The pin STBY\_N controls system entering standby mode by turning off internal amplifier bias circuit. When this pin is connected to Vss, system enters standby mode, and when floated, system works normally.

Note: internal voltage regulating circuit still works in standby mode and supplies working current.

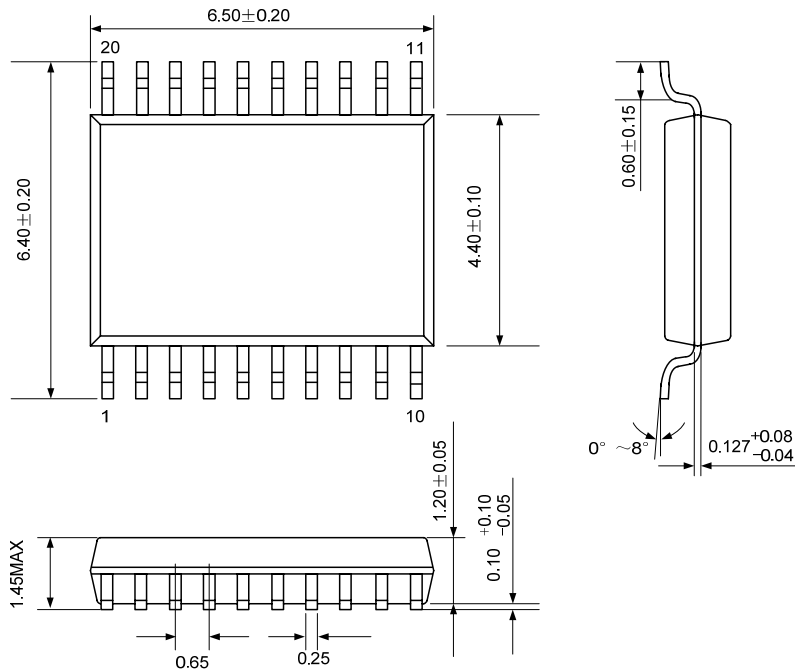
TYPICAL APPLICATION CIRCUIT



PACKAGE OUTLINE

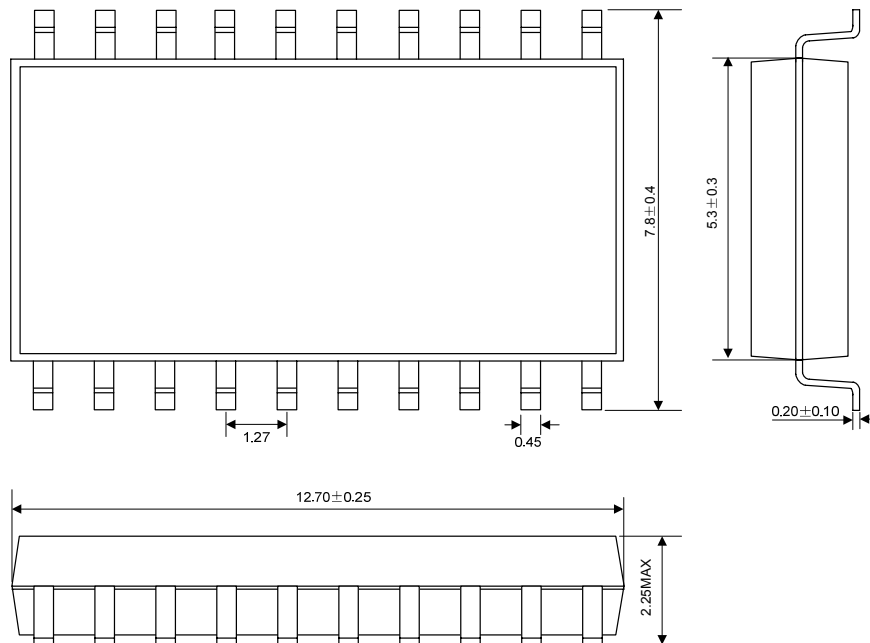
SSOP-20-225-0.65

UNIT: mm



SOP-20-300-1.27

UNIT: mm







**MOS DEVICES OPERATE NOTES:**

Electrostatic charges may exist in many things. Please take following preventive measures to prevent effectively the MOS electric circuit as a result of the damage which is caused by discharge:

- The operator must put on wrist strap which should be earthed to against electrostatic.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed in antistatic/conductive containers for transportation.

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