

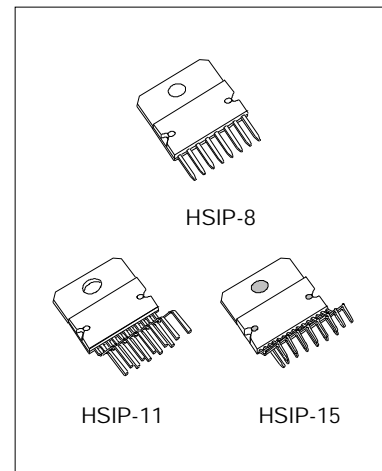
## 2-CH AUDIO POWER AMPLIFIER(25W X2 )

### DESCRIPTION

The SA7264 is a monolithic integrated circuit in HSIP package, intended for use as dual audio frequency class AB amplifier.

### FEATURES

- \* Wide supply voltage range up to 50V ABS MAX.
- \* Split supply operation.
- \* High output power: 25 + 25W @ THD=10%, $R_L=8\Omega$ , $V_s=\pm 20V$
- \* Mute/stand-by function.
- \* Few external components.
- \* Short circuit protection.
- \* Thermal overload protection.



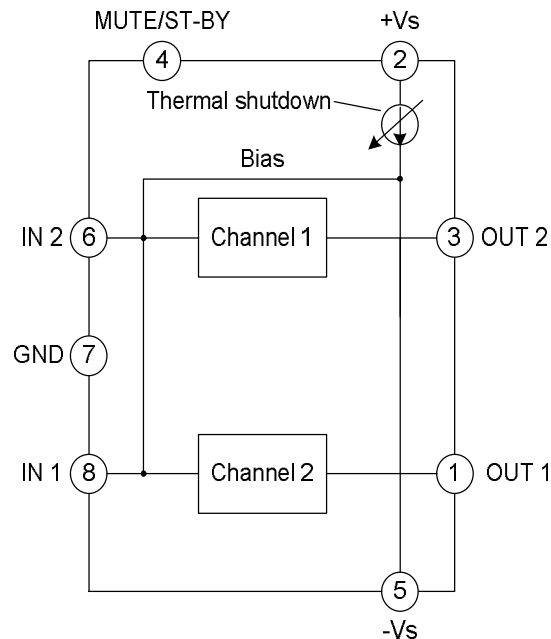
### APPLICATIONS

- \* Hi-Fi music centers
- \* Stereo TV sets

### ORDERING INFORMATION

Part No.	Package
SA7264	HSIP-8
SA7264A	HSIP-15
SA7264B	HSIP-11

### BLOCK DIAGRAM



**Note:** Figures for the SA7264.

**ABSOLUTE MAXIMUM RATING**

Characteristics	Symbol	Ratings	Unit
DC Supply Voltage	$V_s$	50	V
Output Peak Current (Internally Limited)	$I_o$	4.5	A
Power Dissipation $T_{case}=70^{\circ}C$	$P_{tot}$	30	W
Storage And Junction Temperature	$T_{stg}, T_j$	-40~+150	$^{\circ}C$
Supply voltage to guarantee short-circuit protection	$V_{s(sc)}$	$\pm 18^{(*)}$	V
Thermal Resistance From Junction To Case (Max)	$R_{th(j-c)}$	2	$^{\circ}C/W$

(\*)Maximum supply voltage to guarantee short-circuit to  $\pm V_s$  is  $\pm 18V$ , and to GND short-circuit protection is normal.

**ELECTRICAL CHARACTERISTICS (Refer to the test circuit,  $V_s \pm 20V$ ;  $R_L=8\Omega$ ;  $R_s=50\Omega$ ;  $f=1KHz$ ;  $T_{amb}=25^{\circ}C$ , unless otherwise specified.)**

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Supply Range	$V_s$		$\pm 5$		$\pm 22.5$	V
Total Quiescent Current	$I_q$			80	130	mA
Music Output Power(*)	$P_o$	THD=10%; $R_L=8\Omega$ ; $V_s=\pm 22.5V$		32		W
Output Power	$P_o$	THD=10%; $R_L=8\Omega$ ; $V_s=\pm 16V$ ; $R_L=4\Omega$	20	25 25		W W
Output Power	$P_o$	THD=1%; $R_L=8\Omega$ ; $V_s=\pm 16V$ ; $R_L=4\Omega$		20 20		W W
Total Harmonic Distortion	THD	$R_L=8\Omega$ ; $P_o=1W$ ; $f=1kHz$		0.02		%
		$R_L=8\Omega$ ; $P_o=0.1\sim 15W$ ; $f=100Hz\sim 15kHz$			0.5	%
		$R_L=4\Omega$ ; $P_o=1W$ ; $f=1kHz$		0.03		%
		$R_L=4\Omega$ ; $V_s=\pm 16V$ ; $P_o=0.1\sim 12W$ ; $f=100Hz\sim 15kHz$			1	%
Cross Talk	CT	$f=1kHz$		70		dB
		$f=10kHz$		60		dB
Slew Rate	SR			10		$V/\mu s$
Closed Loop Voltage Gain	GV		29	30	31	dB

(To be continued)

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Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Voltage Gain Matching	$\Delta GV$			0.2		dB
Total Input Noise	eN	A curve f=20Hz~22kHz		2.5 3.5	8	$\mu V$ $\mu V$
Input Resistance	Ri		15	20		k $\Omega$
Supply Voltage Rejection (each channel)	SVR	fr=100Hz; Vripple=0.5Vrms		60		dB
Thermal Shut-down Junction Temperature	Tj			145		$^{\circ}C$
Mute Function [ref: +Vs]						
Mute /Play Threshold	VTMUTE		-7	-6	-5	V
Mute Attenuation	AM		60	90		dB
Stand-by Function [ref: +Vs]						
Stand-by /Mute Threshold	VTST-BY		-3.5	-2.5	-1.5	V
Stand-by Attenuation	AST-BY			110		dB
Quiescent Current @ St-by	Iq ST-BY			3		mA

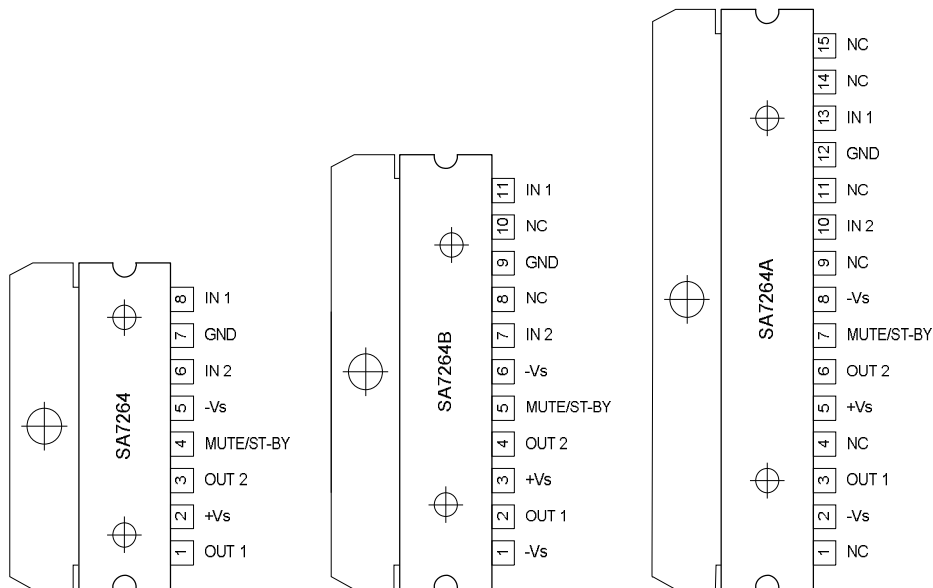
Note:

\* Music Output Power is the maximal power which the amplifier is capable of producing across the rated load resistance (regardless of non linearity) 1 sec after the application of a sinusoidal input signal of frequency 1KHz.

According to this definition, the method of measurement comprises the following steps:

- 1) Set the voltage supply at the maximum operating value -10%
- 2) Apply a input signal in the form of a 1KHz tone burst of 1 sec duration; the repetition period of the signal pulses is > 60 sec
- 3) The output voltage is measured 1 sec from the start of the pulse
- 4) Increase the input voltage until the output signal show a THD = 10%
- 5) The music power is then  $V_{out}^2/RL$ , where  $V_{out}$  is the output voltage measured in the condition of point 4) and R1 is the rated load impedence

The target of this method is to avoid excessive dissipation in the amplifier.

**PIN CONFIGURATION**


Note: Tab connected to -Vs.

**PIN DESCRIPTION**

Pin No.			Pin name	Pin description
HSIP-8	HSIP-11	HSIP-15		
8	11	13	IN 1	Input 1
6	7	10	IN2	Input 2
1	2	3	OUT 1	Output1
3	4	6	OUT 2	Output2
7	9	12	GND	Ground
2	3	5	+Vs	Positive power
5	1, 6	2, 8	-Vs	Negative power
4	5	7	MUTE / ST-BY	Mute /stand-by function
	8, 10	1, 4, 9, 11, 14, 15	NC	Not connected

**FUNCTION DESCRIPTION**
**MUTE STAND-BY FUNCTION**

The PIN mute/st\_by controls the amplifier status by two different thresholds, referred to +Vs.

- ∅ When  $V_{mute/st\_by}$  higher than  $+Vs - 2.5V$  the amplifier is in Stand-by mode and the final stage generators are off
- ∅ When  $V_{mute/st\_by}$  is between  $+Vs - 2.5V$  and  $+Vs - 6V$  the final stage current generators are switched on and the amplifier is in mute mode
- ∅ When  $V_{mute/st\_by}$  is lower than  $+Vs - 6V$  the amplifier is play mode.

## POWER DISSIPATION AND HEAT SINKING

The SA7264 must always be operated with a heat sink, even when it is not required to drive a load. The idling current of the device is 80mA, so that on a  $\pm 20V$  power supply an unloaded SA7264 must dissipate about 3W of power. The  $54^{\circ}C/W$  junction-to-ambient thermal resistance of a HSIP-11 package would cause the die temperature to rise  $162^{\circ}C$  above ambient, so the thermal protection circuitry will shut the amplifier down if operation without a heat sink is attempted.

In order to determine the appropriate heat sink for a given application, the power dissipation of the SA7264 in that application must be known. When the load is resistive, the maximum average power that the IC will be required to dissipate is approximately:

$$PD(MAX)=V_s^2/\pi^2RL+PQ$$

Where  $V_s$  is the total power supply voltage across the SA7264,  $R_L$  is the load resistance  $PQ$  is the quiescent power dissipation of the amplifier. The above equation is only an approximation which assume an "ideal" class B output stage and constant power dissipation in all other parts of the circuit. The curves of "Power Dissipation vs. Power Output" give a better representation of the behaviour of the SA7264 with various power supply voltages and resistive loads. As an example, if the SA7264 is operated on a  $\pm 20V$  power supply with a resistive load of  $8\Omega$ , it can develop up to 23W of internal power dissipation. If the die temperature is to remain below  $150^{\circ}C$  for ambient temperatures up to  $50^{\circ}C$ , the total junction-to-ambient thermal resistance must be less than:

$$(150^{\circ}C-50^{\circ}C)/23W=4.3^{\circ}C/W$$

Using  $R_{th(j-c)} = 2^{\circ}C/W$ , the sum of the case-to-heat-sink interface thermal resistance and the heat-sink-to-ambient thermal resistance must be less than  $2.3^{\circ}C/W$ . The case-to-heat-sink thermal resistance of the HSIP-11 package varies with the mounting method used. A metal-to-metal interface will be about  $1^{\circ}C/W$  if lubricated, and about  $1.2^{\circ}C/W$  if dry.

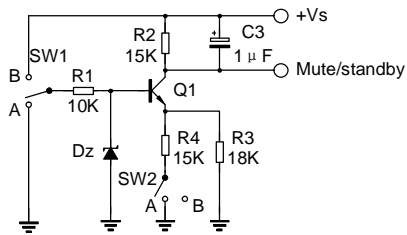
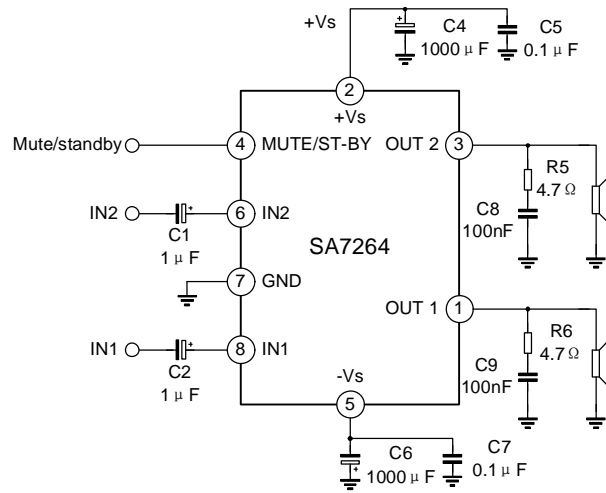
If a mica insulator is used, the thermal resistance will be about  $1.6^{\circ}C/W$  lubricated and  $3.4^{\circ}C/W$  dry. For this example, we assume a lubricated mica insulator between the SA7264 and the heat sink. The heat sink thermal resistance must then be less than:

$$4.3^{\circ}C/W-2^{\circ}C/W-1.6^{\circ}C/W=0.7^{\circ}C/W$$

This is a rather large heat sink and may not be practical in some applications. If a smaller heat sink is required for reasons of size or cost, there is an alternative. The heat sink can be isolated from the chassis so the mica washer is not needed. This will change the required heat sink to a  $1.3^{\circ}C/W$  unit if the case-to-heat-sink interface is lubricated.

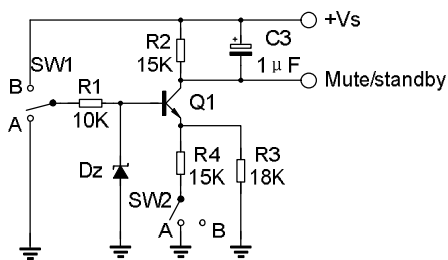
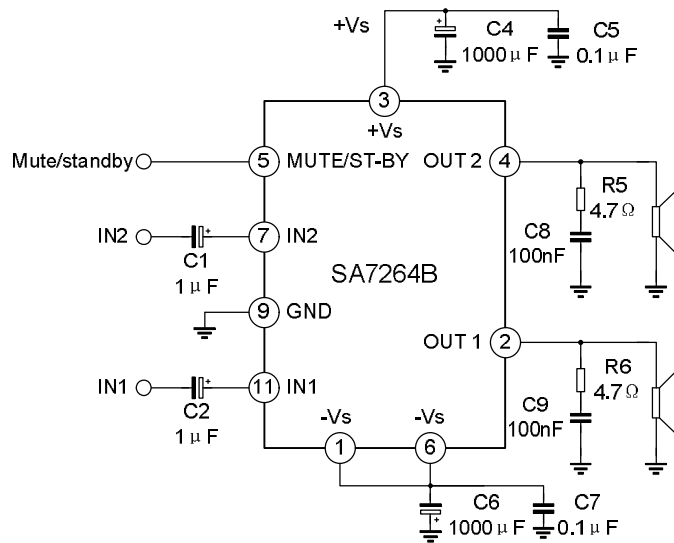
The thermal requirements can become more difficult when an amplifier is driving a reactive load. For a given magnitude of load impedance, a higher degree of reactance will cause a higher level of power dissipation within the amplifier. As a general rule, the power dissipation of an amplifier driving a  $60^{\circ}$  reactive load (usually considered to be a worst-case loudspeaker load) will be roughly that of the same amplifier driving the resistive part of that load. For example, a loudspeaker may at some frequency have an impedance with a magnitude of  $8\Omega$  and a phase angle of  $60^{\circ}$ . The real part of this load will then be  $4\Omega$ , and the amplifier power dissipation will roughly follow the curve of power dissipation with a  $4\Omega$  load.

TYPICAL APPLICATION CIRCUIT SA7264



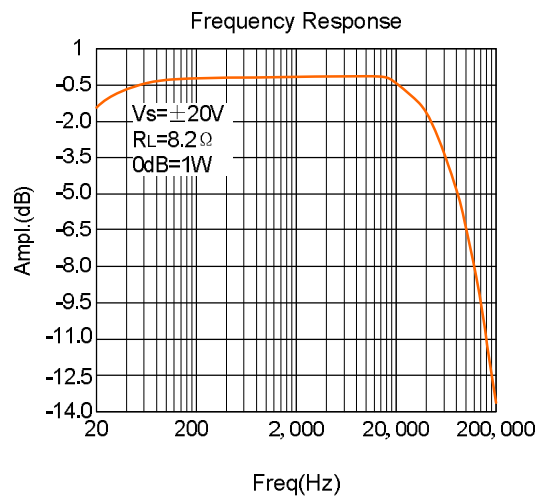
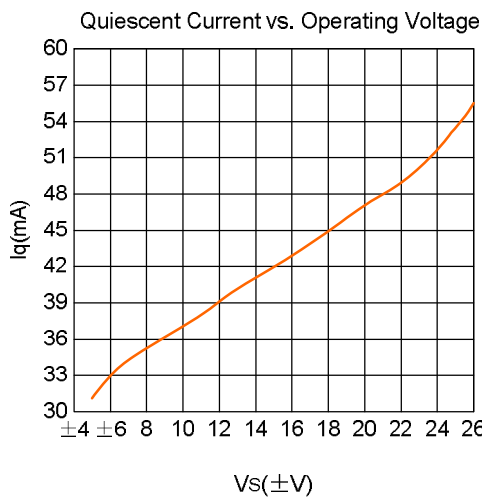
SW1	SW2	
A	A	Stand-by
A	B	Stand-by
B	B	Mute
B	A	Play

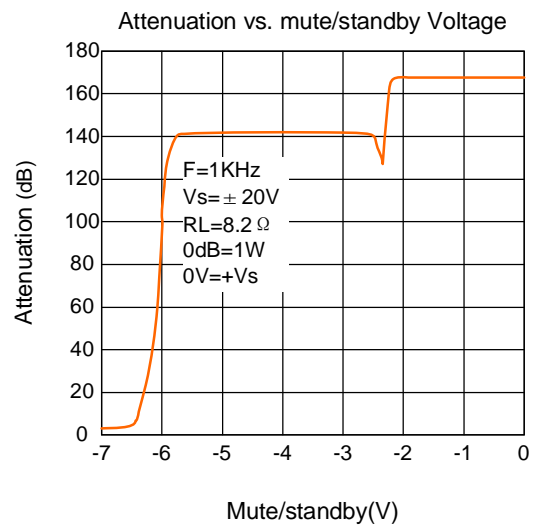
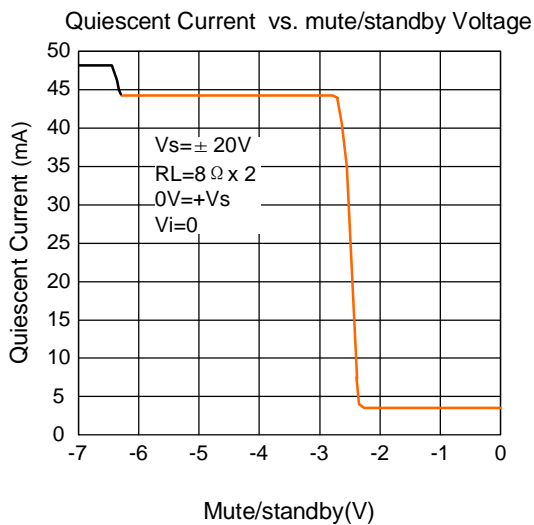
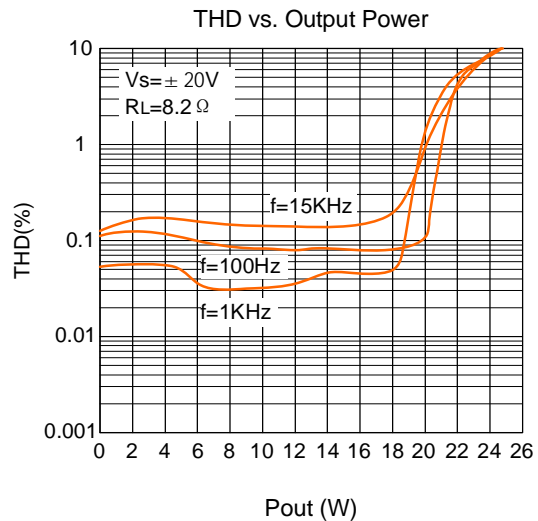
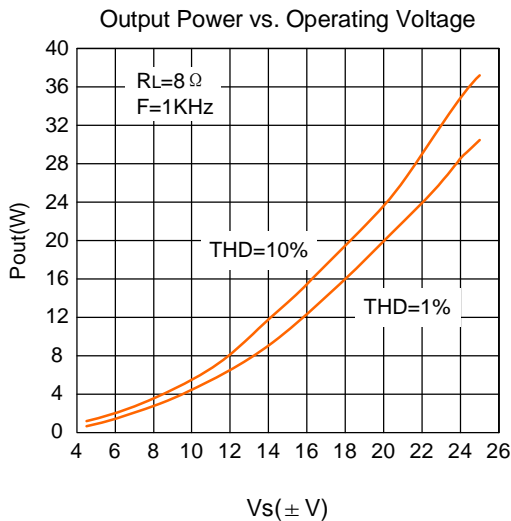
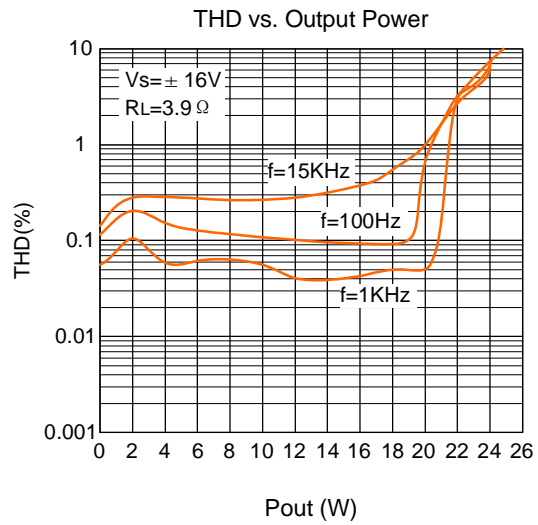
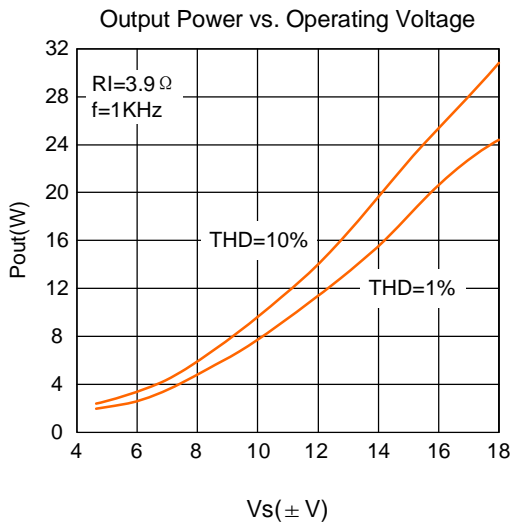
TYPICAL APPLICATION CIRCUIT SA7264B



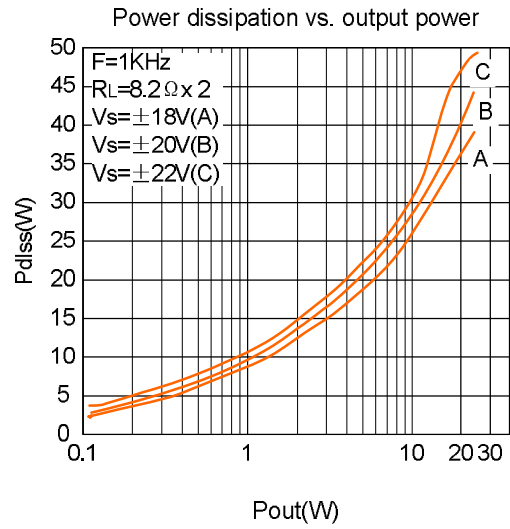
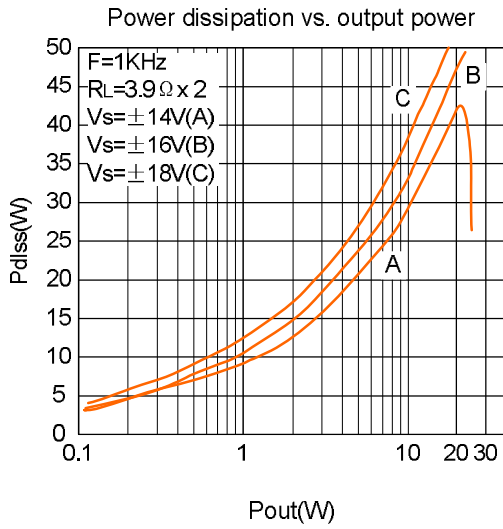
SW1	SW2	
A	A	Stand-by
A	B	Stand-by
B	B	Mute
B	A	Play

ELECTRICAL CHARACTERISTICS CURVES

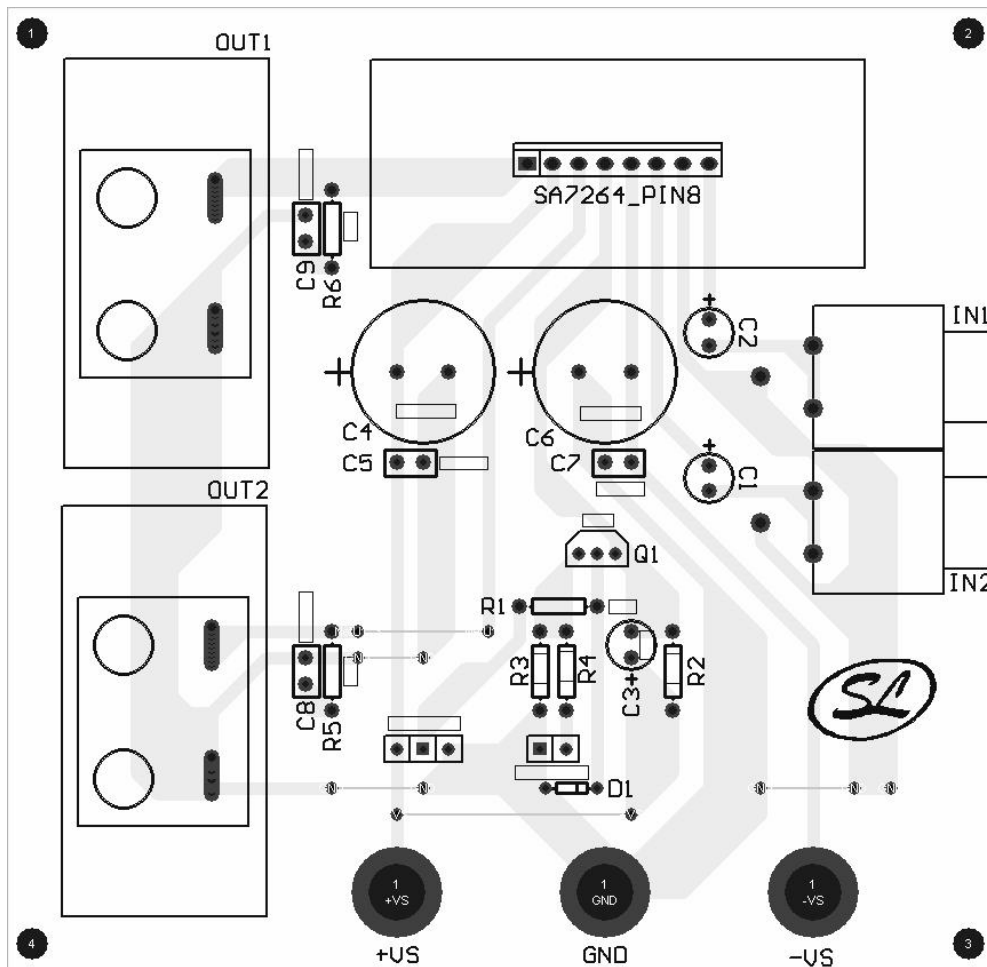




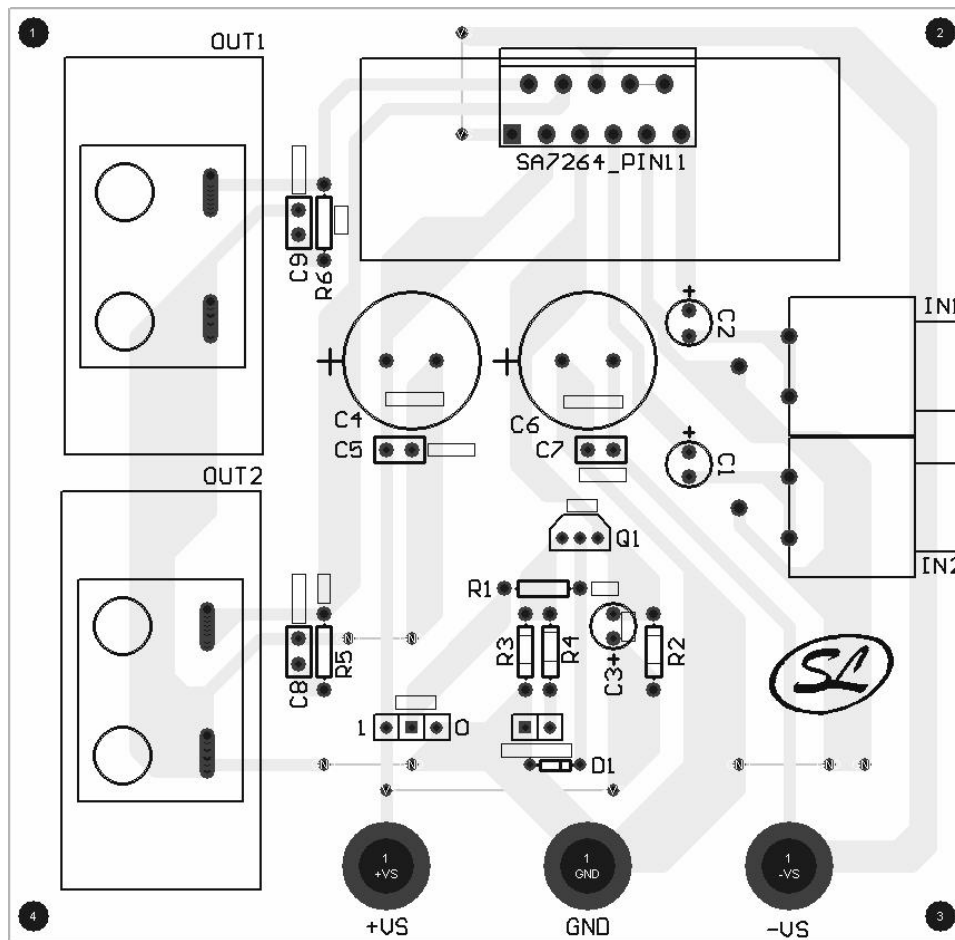




PC BOARD AND COMPINENTS LAYOUT OF SA7264



PC BOARD AND COMPONENTS LAYOUT OF SA7264B



APPLICATION SUGGEST

The recommended values of the external components are those shown are the **Typical Application Circuit**

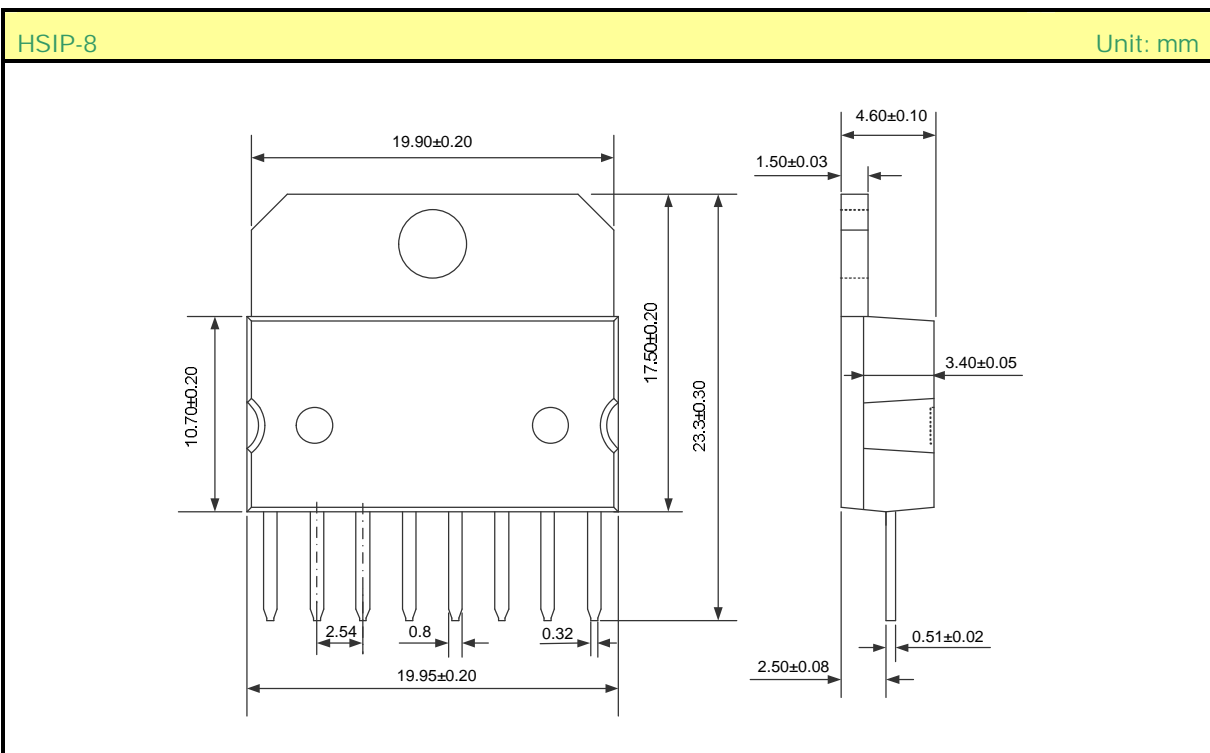
COMPONENTS	RECOMMENDED VALUE	PURPOSE	LARGER THAN RECOMMENDED VALUE	SMALLER THAN RECOMMENDED VALUE
R1	10KΩ	Mute Circuit	Increase of Dz Biasing Current	
R2	15KΩ	Mute Circuit	VMUTE/STBY Downward	VMUTE/STBY Upward
R3	18KΩ	Mute Circuit	VMUTE/STBY Upward	VMUTE/STBY Downward
R4	15KΩ	Mute Circuit	VMUTE/STBY Upward	VMUTE/STBY Downward
R5, R6	4.7Ω	Frequency Stability	Danger of Oscillations	Danger of Oscillations

(To be continued)

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COMPONENTS	RECOMMENDED VALUE	PURPOSE	LARGER THAN RECOMMENDED VALUE	SMALLER THAN RECOMMENDED VALUE
C1, C2	1 $\mu$ F	Input DC Decoupling		Higher Low Frequency Cutoff
C3	1 $\mu$ F	St-By/Mute Time Constant	Larger On/Off Time	Smaller On/Off Time
C4, C6	1000 $\mu$ F	Supply Bypass		Danger of Oscillations
C5, C7	0.1 $\mu$ F	Supply Bypass		Danger of Oscillations
C8, C9	0.1 $\mu$ F	Frequency Stability		
Dz	5.1V	Mute Circuit		
Q1	BC107	Mute Circuit		

PACKAGE OUTLINE



PACKAGE OUTLINE

