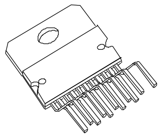
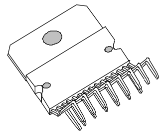
2-CH AUDIO POWER AMPLIFIER(20W X 2)

DESCRIPTION

The SA7267 is a monolithic integrated circuit in HSIP package, intended for use as dual audio frequency class AB amplifier.



HSIP-11



HSIP-15

FEATURES

* Wide supply voltage range(up to ±20V)
* Split supply operation.
* High output power: 20W+20W @ THD=10%, R_L=4Ω, Vs=±15V
* Mute/stand-by function.
* Few external components.
* Short circuit protection.
* Thermal shutdown protection.

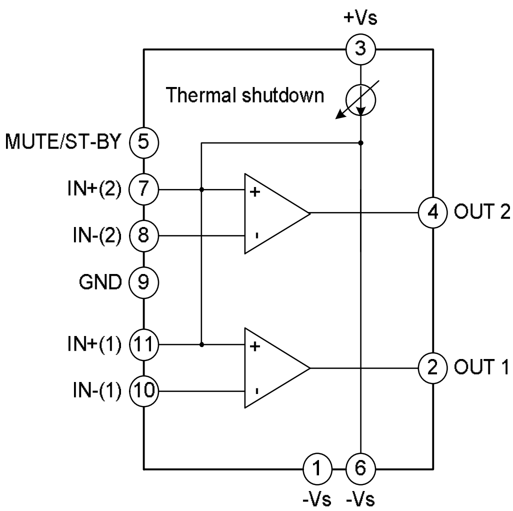
APPLICATIONS

* Hi-Fi music centers
* Stereo TV sets

ORDERING INFORMATION

Part No.	Package
SA7267	HSIP-11
SA7267A	HSIP-15

BLOCK DIAGRAM



Note: Figures for the SA7267.

ABSOLUTE MAXIMUM RATING

Characteristics	Symbol	Rating	Unit
DC Supply Voltage	V_s	40	V
Output Peak Current (Internally Limited)	I_o	3	A
Power Dissipation Tcase=70°C	P_{tot}	40	W
Storage And Junction Temperature	T_{stg}, T_j	-40~+150	°C
Supply voltage to guarantee short-circuit protection	$V_{s(sc)}$	±18(*)	V
Thermal Resistance From Junction To Case (Max)	$R_{th(j-c)}$	2	°C/W

(*)Maximum supply voltage to guarantee short-circuit to ±Vs is ±18V, and to GND short-circuit protection is normal.

ELECTRICAL CHARACTERISTICS

(Refer to the test circuit, Vs=±15V; R_L=4Ω; Rs=50Ω; Gv=30dB; f=1KHz; T_{amb}=25°C, unless otherwise specified.)

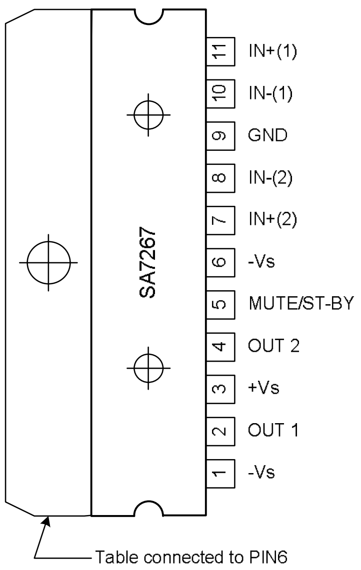
Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Supply Range	V_s		±5		±20	V
Total Quiescent Current	I_q			50	100	mA
Input Offset Voltage	V_{os}		-25		+25	mV
In-phase Input Bias Current	I_b			500		nA
Output Power	P_o	THD=10%; R_L=4Ω; R_L=8Ω		 20 12.5		 W W
Total Harmonic Distortion	THD	RL=8Ω; Po=1W; f=1KHz		0.03		%
		R_L=8Ω; P_o=0.1~5W; f=100Hz~15KHz			0.7	%
		R_L=4Ω; P_o=1W; f=1KHz		0.02		%
		R_L=4Ω; P_o=0.1~5W; f=100Hz~15KHz			1	%
Cross Talk	CT	f=1KHz f=10KHz	 50	70 60		dB dB
Slew Rate	SR		6.5	8		V/µs
Open Loop Voltage Gain	GV			80		dB
Total Noise Input Voltage	e_N	A curve f=20Hz~22KHz		3 4	 8	µV µV
Input Resistance	Ri		15	20		KΩ
Supply Voltage Rejection (each channel)	SVR	Fr=100Hz; V_{ripple}=0.5Vrms		60		dB

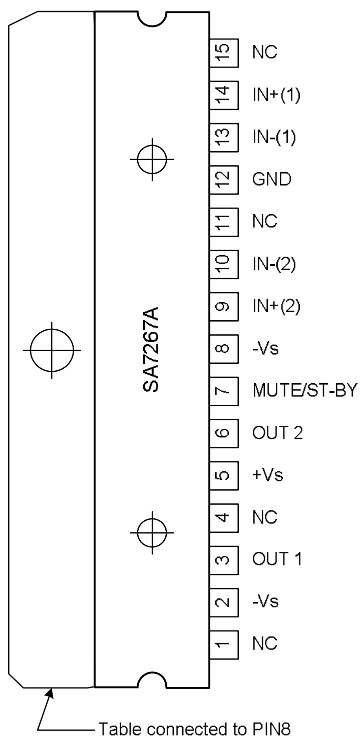
(To be continued)

(Continued)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Thermal Shut-down Junction Temperature	Tj			145		°C
Mute Function [ref: +Vs]						
Mute /Play Threshold	VTMUTE		-7	-6	-5	V
Mute Attenuation	AM		60	70		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 @ Stand-by	Iq ST-BY			3	6	mA

PIN CONFIGURATION





PIN DESCRIPTION

Pin No.		Pin Name	I/O	Pin Description
HSIP-11	HSIP-15			
1	2	-Vs	--	Negative power
2	3	OUT 1	O	Output1
3	5	+Vs	--	Positive power
4	6	OUT 2	O	Output2
5	7	MUTE / ST-BY	I	Mute /stand-by function

(To be continued)

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Pin No.		Pin Name	I/O	Pin Description
HSIP-11	HSIP-15			
6	8	-Vs	--	Negative power
7	9	IN+(2)	I	Inverting Input 2
8	10	IN-(2)	I	Non inverting input 2
9	12	GND	--	Ground
10	13	IN-(1)	I	Non inverting input 1
11	14	IN+(1)	I	Inverting input 1
	1,4,11,15	NC	--	Not connected

FUNCTION DESCRIPTION

MUTE STAND-BY FUNCTION

The MUTE/ST-BY controls the amplifier status by two different thresholds, referred to +Vs.

- When MUTE/ST-BY higher than +Vs - 2.5V, the amplifier is in Stand-by mode and the final stage generators are off.
- When 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 MUTE/ST-BY is lower than +Vs - 6V, the amplifier is in play mode.

Power Dissipation and Heat Sinking

The SA7267 must always be operated with a heat sink. In order to determine the appropriate heat sink for a given application, the power dissipation of the SA7267 in that application must be known. When the load is a resistor, the maximum average power of the IC is approximately:

$$P_{D(MAX)}=Vs^2/\pi^2R_L+PQ$$

Where VS is the total power supply voltage across the SA7267, RL is the load resistance and PQ is the quiescent power dissipation of the amplifier. The above equation is only an approximation which assumes 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 behavior of the SA7267 with various power supply voltages and resistors. As an example, if the SA7267 is operated on a ±15V power supply with a resistance of 4Ω, it can develop up to 24.5W of internal power dissipation. If the die temperature is to remain below 150°C for ambient temperatures up to 50°C, the total junction-to-ambient thermal resistance must be less than:

(150°C－50°C)/24.5W＝4.1°C/W

Using Rth(j-c) = 2°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 2.1°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°C /W if use the thermal resistance, and about 1.2°C /W if not.

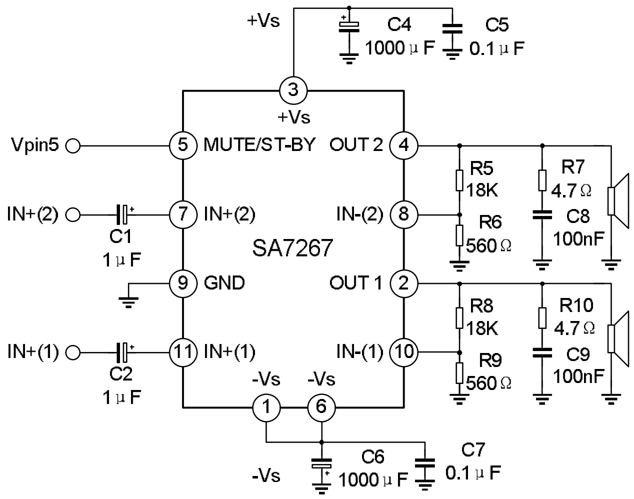
If a mica insulator is used, the thermal resistance will be about 1.6°C /W lubricated and 3.4°C /W dry. For this example, we assume a lubricated mica insulator between the SA7267 and the heat sink. The heat sink thermal resistance must then be less than:

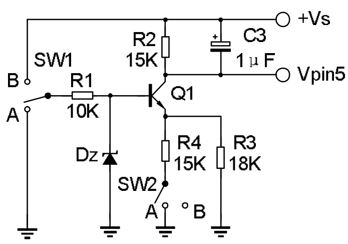
4.1°C/W-2°C/W-1.6°C/W＝0.5°C/W

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, 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 1.1°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 60º 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 impedance with a magnitude of 8Ω and a phase angle of 60º. The real part of this load will then be 4Ω, and the amplifier power dissipation will roughly follow the curve of power dissipation with a 4Ω resistor.

TYPICAL APPLICATION CIRCUIT IN SPLIT SUPPLY

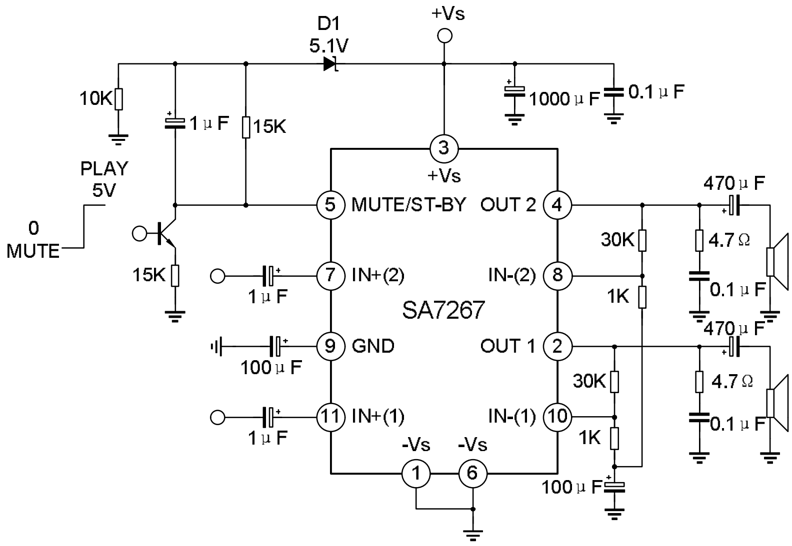




SW1	SW2	
A	A	Stand-by
A	B	Stand-by
B	B	Mute
B	A	Play

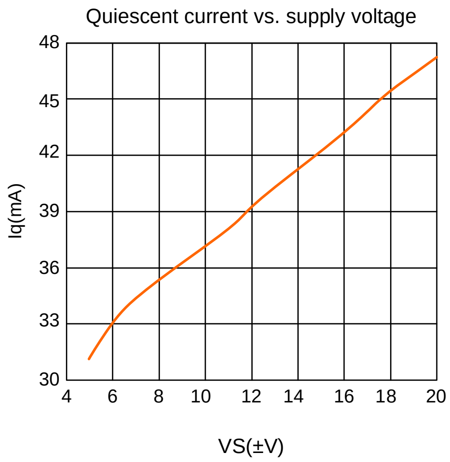
Note: Figures for the SA7267.

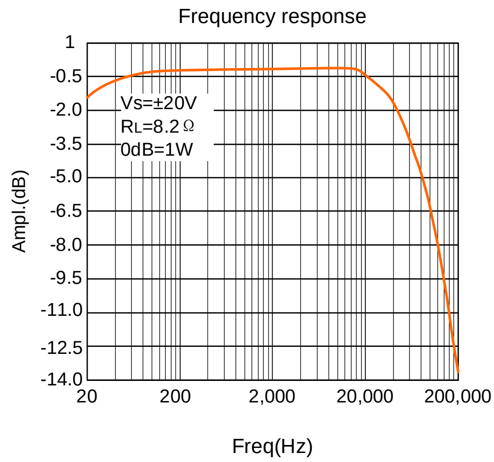
TYPICAL APPLICATION CIRCUIT IN SINGLE SUPPLY

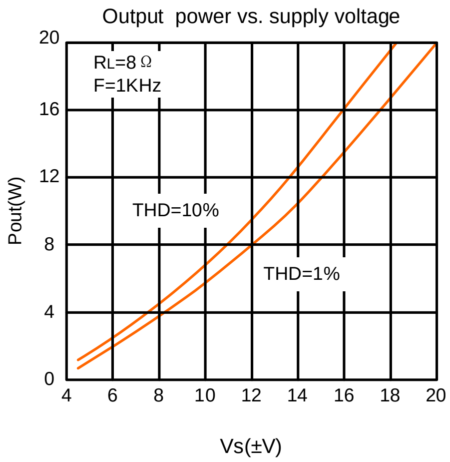


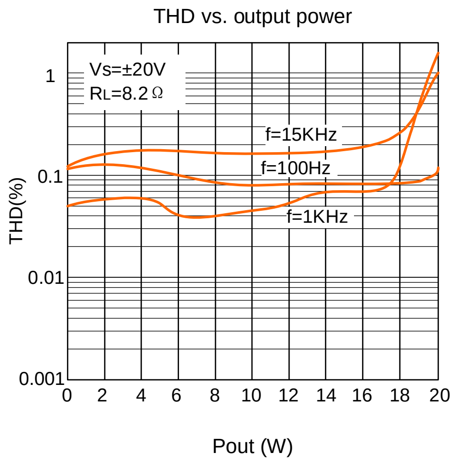
Note: Figures for the SA7267.

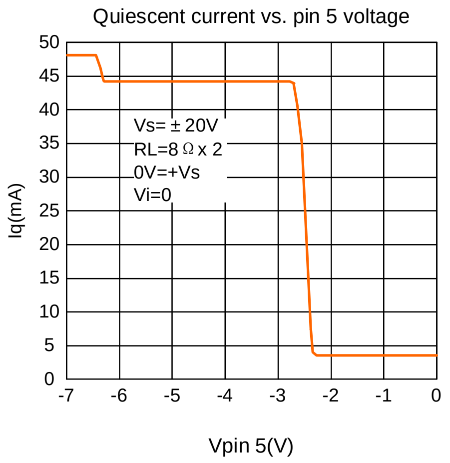
ELECTRICAL CHARACTERISTICS CURVES

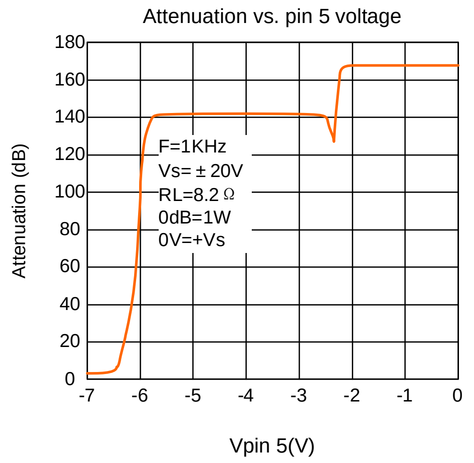












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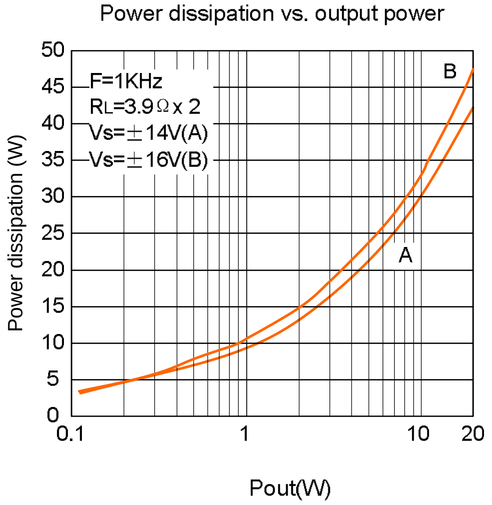
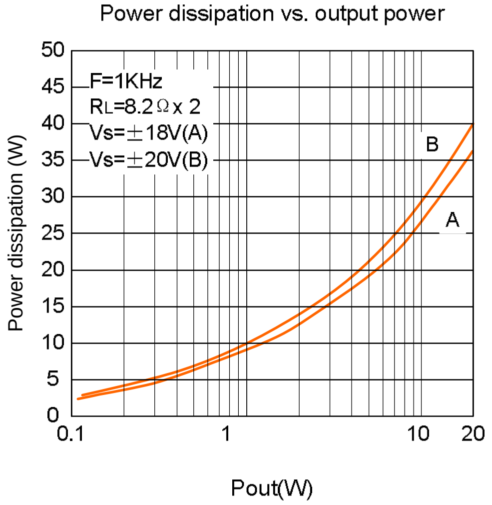
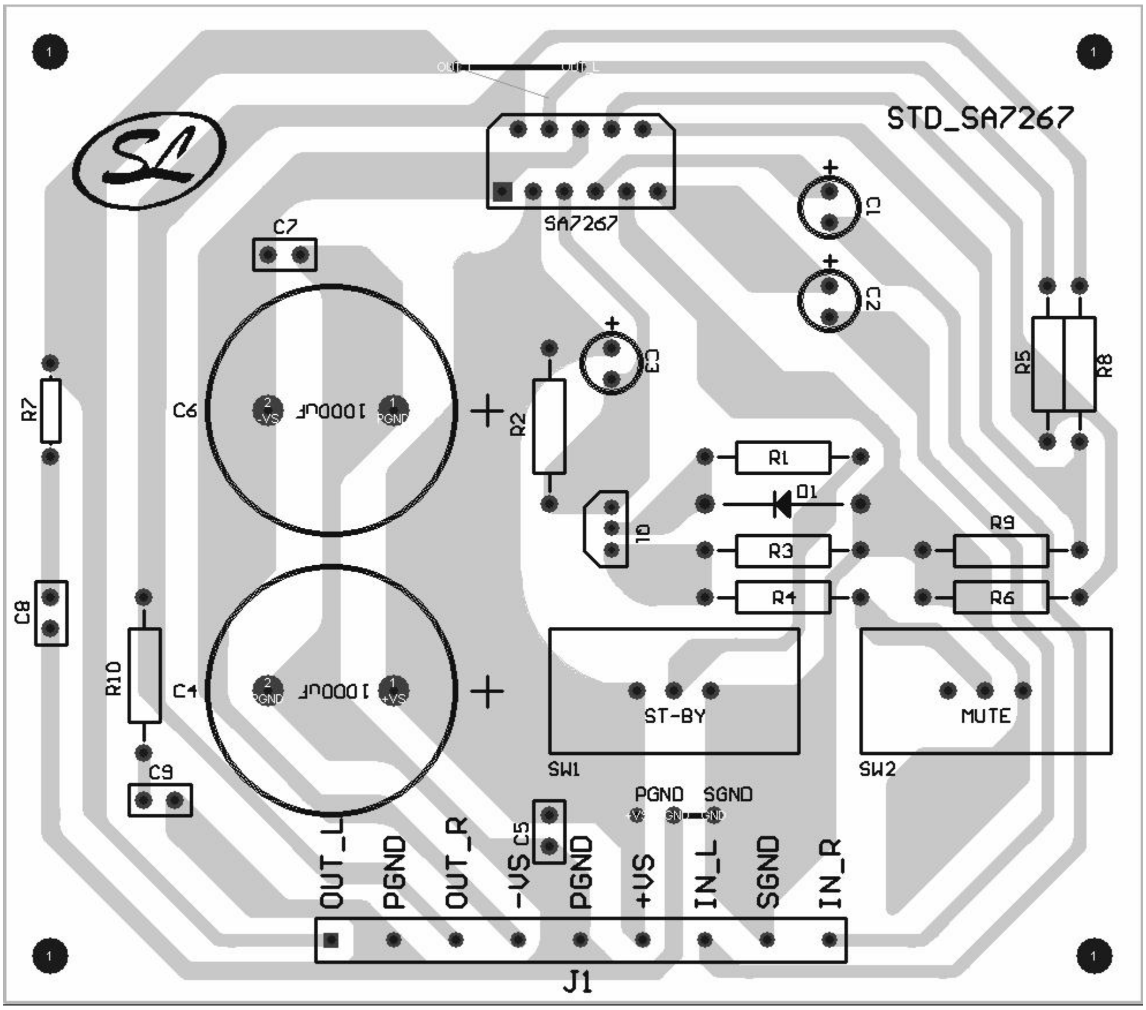




PC BOARD AND COMPINENTS LAYOUT OF THE TYPICAL APPLICATION IN SPLIT SUPPLY



APPLICATION SUGGEST

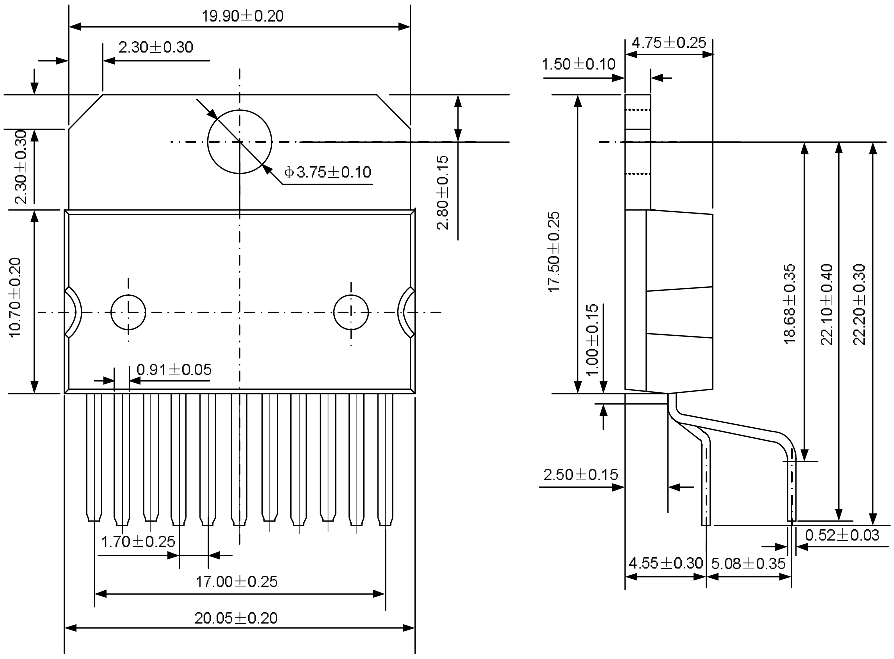
The recommended values of the external components shown are the **Typical Application Circuit in Split Supply**:

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 Shifted Downward	VMUTE/STBY Shifted Upward
R3	18KΩ	Mute Circuit	VMUTE/STBY Shifted Upward	VMUTE/STBY Shifted Downward
R4	15KΩ	Mute Circuit	VMUTE/STBY Shifted Upward	VMUTE/STBY Shifted Downward
R5, R8	18KΩ	Closed Loop Gain Setting*	Increase of Gain	
R6, R9	560Ω		Decrease of Gain	
R7, R10	4.7Ω	Frequency Stability	Danger of Oscillations	Danger of Oscillations
C1, C2	1μF	Input DC Decoupling		Higher Low Frequency Cutoff
C3	1μF	St-By/Mute Time Constant	Larger On/Off Time	Smaller On/Off Time
C4, C6	1000μF	Supply Bypass		Danger of Oscillations
C5, C7	0.1μF	Supply Bypass		Danger of Oscillations
C8, C9	0.1μF	Frequency Stability		
Dz	5.1V	Mute Circuit		
Q1	BC107	Mute Circuit		

* Closed loop gain has to be ≥ 25dB.

PACKAGE OUTLINE

HSIP-11 Unit: mm



HSIP-15 Unit: mm