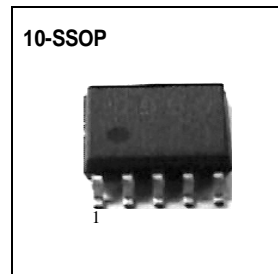# BM7000
Low Power Amplifier

Features

- Low quiescent current
- High power supply ripple rejection
- Low voltage operation
- A few of external part required
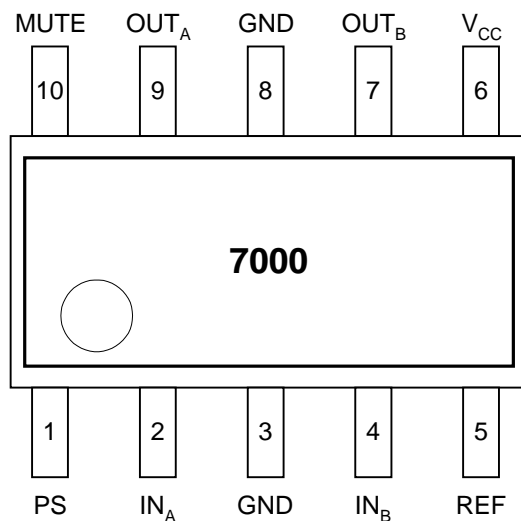- Built in power save switch & mute switch

Typical Applications

- Portable compact disk player (DISCMAN)
- Portable mini disk player (MD)
- Disc-man
- MP3 player
- CD-ROM
- Other potable compact disk media
  Fan motor drive

Description

The BM7000 is a monolithic integrated circuit and suitable dual amplifier for low power.

10-SSOP

Pin Assignments

MUTE OUT$_A$ GND OUT$_B$ V$_{CC}$

| 10 | 9 | 8 | 7 | 6 |

7000

| 1 | 2 | 3 | 4 | 5 |

PS IN$_A$ GND IN$_B$ REF

Pin Definitions

Pin Number	Pin Name	Pin Function Description
1	PS	Power Save Switch
2	IN$_A$	Signal Input A
3	GND	Signal Ground
4	IN$_B$	Signal Input B
5	REF	Reference Voltage
6	V$_{CC}$	Supply Voltage
7	OUT$_B$	Signal Output B
8	GND	Power Ground
9	OUT$_A$	Signal Output A
10	MUTE	Mute On Switch

Internal Block Diagram
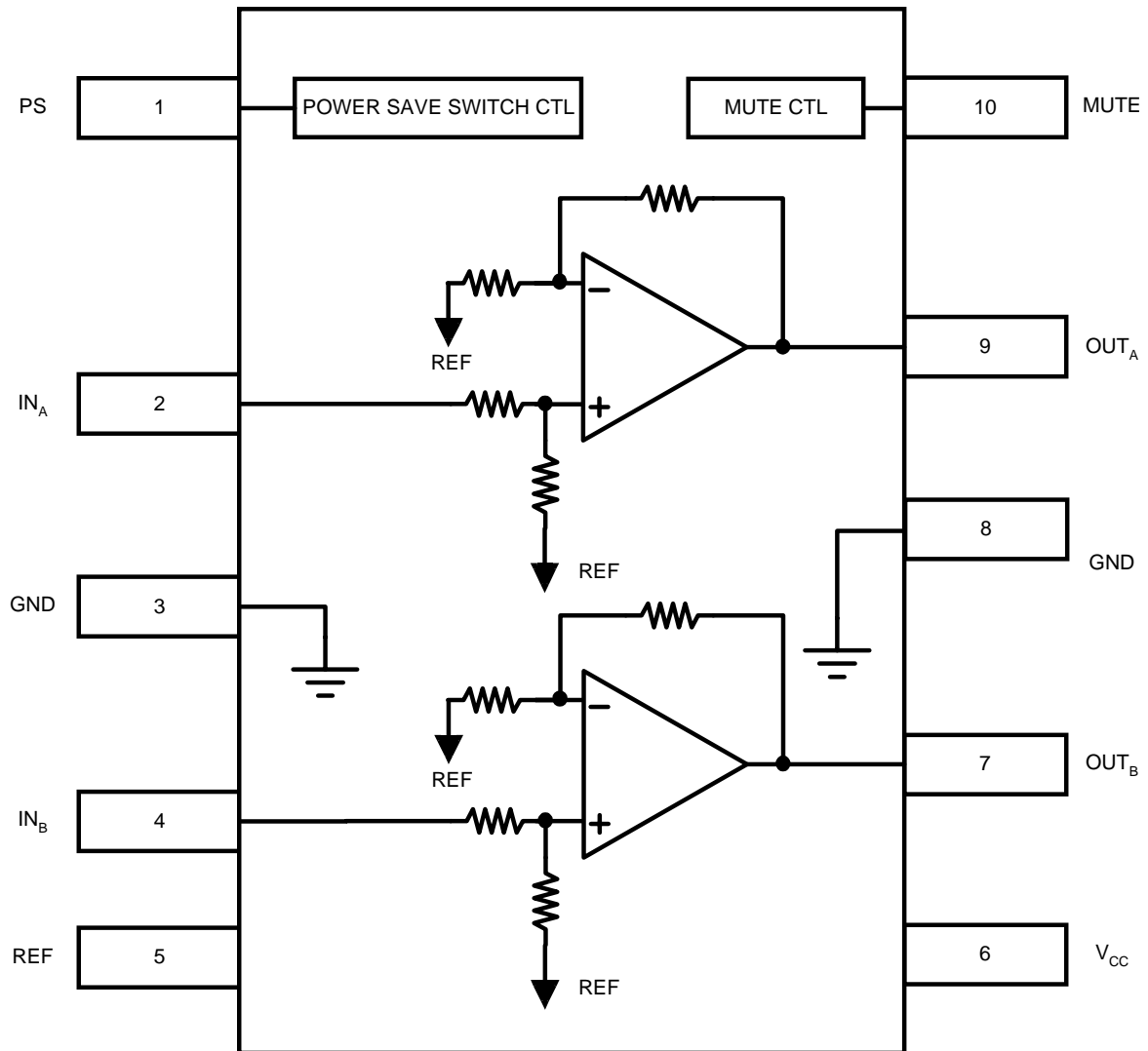
Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Value	Unit	Remark
Maximum Supply Voltage	V_{CC}	4.5	V	Maximum supply voltage
Power Dissipation	P_D	300	mW	Power dissipation
Operating Temperature	T_{OPR}	−20 ~ +75	°C	Operating temperature
Storage Temperature	T_{STG}	−55 ~ +125	°C	Storage temperature
Thermal Resistance	T_{ja}	150	°C/W	–

Power Dissipation Curve
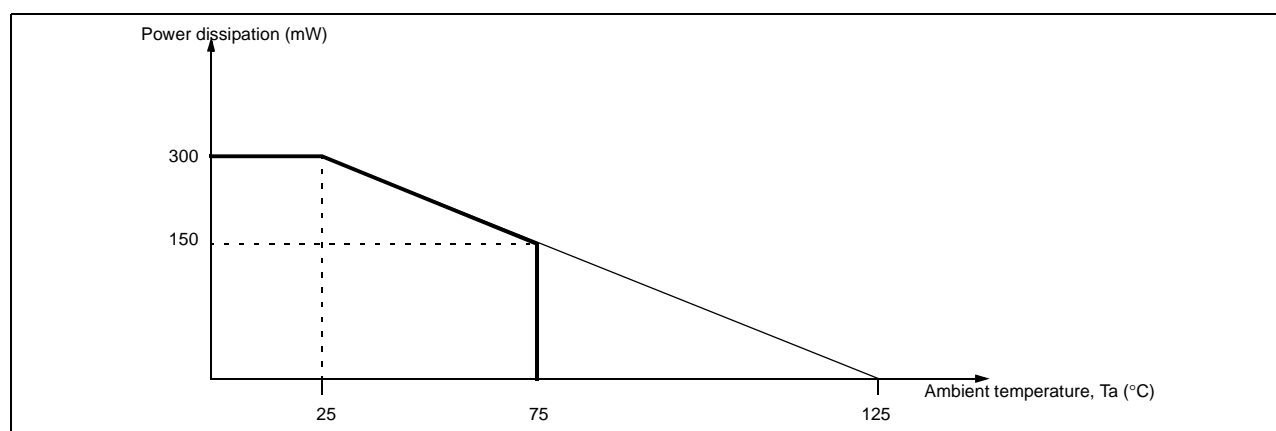
Recommended Operating Conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Supply Voltage	V_{CC}	1.8	3.0	4.0	V
Recommended Load	R_L	16	–	32	Ω

Electrical Characteristics (R$_L$ = 16Ω, Rg = 600Ω, Ta = 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Current 1	I$_{CC1}$	V$_{CC}$ = 2.4V	-	5.5	10.0	mA
Quiescent Current 2	I$_{CC2}$	V$_{CC}$ = 4.5V, Mute = GND	-	1.0	2.0	mA
Quiescent Current 3	I$_{CC3}$	V$_{CC}$ = 4.5V, PS = GND	-	-	1.0	μA
Close Loop Voltage Gain 1	G$_{VC1}$	V$_{CC}$ = 2.4V, f = 1KHz, V$_O$ = −10dBm	30	32	34	dB
Close Loop Voltage Gain 2	G$_{VC1}$	V$_{CC}$ = 1.8V, f = 1KHz, V$_O$ = −20dBm	29	32	34	dB
Channel Balance 1	ΔG$_{V1}$	V$_{CC}$ = 2.4V, f = 1KHz, V$_O$ = −10dBm	-	-	1.0	dB
Channel Balance 2	ΔG$_{V2}$	V$_{CC}$ = 1.8V, f = 1KHz, V$_O$ = −20dBm	-	-	1.0	dB
Total Harmonic Distortion	THD	V$_{CC}$ = 2.0V, f = 1KHz, P$_O$ = 1mW	-	0.5	1.5	%
Ripple Rejection Ratio	RR	V$_{CC}$ = 1.8V, f = 100Hz, Rg = 1KΩ, V$_R$ = −20dBm, BPF = 100Hz	43	60	-	dB
Crosstalk	CT	V$_{CC}$ = 2.4V, f = 100Hz, Rg = 1KΩ, V$_O$ = −10dB	43	50	-	dB
Output Noise Voltage	V$_{NOISE}$	V$_{CC}$ = 4.5V, Rg = 1KΩ, BPF = 20Hz ~ 20KHz	-	60	100	μVrms
Output Power	P$_{OUT}$	V$_{CC}$ = 3.0V, f = 1KHz, THD = 10%	20	40	-	mW
PS Attenuation Ratio	ATT$_{PS}$	V$_{CC}$ = 1.8V, f = 100Hz, PS = GND, V$_{IN}$ = −10dB	-	-	-80	dB
MUTE attenuation ratio	ATT$_{MU}$	V$_{CC}$ = 1.8V, f = 100Hz, MUTE = GND, V$_{IN}$ = −10dB	-	-	-80	dB
PS ON input current	I$_{PSON}$	V$_{CC}$ = 1.5V, V$_{REF}$ ≥ 0.85V	-	0.2	1.0	μA
MUTE OFF input current	I$_{MOFF}$	V$_{CC}$ = 1.5V, V$_{REF}$ ≥ 0.85V	-	0.2	1.0	μA
PS ON high level	V$_{HPS}$	V$_{CC}$ = 1.5V, V$_{REF}$ ≥ 0.85V	0.5	0.65	-	V
MUTE OFF high level	V$_{HMU}$	V$_{CC}$ = 1.5V, V$_{REF}$ ≥ 0.85V	0.5	0.65	-	V

Application Information

1. PS Block

This block diagram describes the power save switch circuits.

The drive block is controlled by PS pin, which can be derived from micro controller.

It controls bias of the internal circuits of BM7000, so that it makes BM7000 operate when input voltage level

reaches high level.

2. Mute Block

The block diagram describes the mute on switch circuits.

The drive block is controlled by MUTE pin, which can be derived from micro controller.

When the pin of mute turns on, it makes reference voltage of internal circuits approximately 0V, so that it keeps the

device of BM7000 off.

3. AMP Block

This block diagram describes the AMP block with resistances, which control gain of BM7000.

The gain of BM7000 is $\dfrac{V_{OUT}}{V_{IN}} \cong 40 \cong 32\,[dB]$

Output voltage of BM7000 can be 40 times as much as input voltage, so it eliminates the number of external

circuits and offers headphone input.

4. Popping Noise Reduction

If PS pin (Pin1 , Power save switch) connect the micro controller, the micro controller must follow the same

sequence 1 in order to reduce popping noise on mute mode.

PS on $\rightarrow$ Mute on $\rightarrow$ PS off $\rightarrow$ Mute operation $\rightarrow$ PS on $\rightarrow$ Mute off $\rightarrow$ Normal operation (Sequence 1)

If PS connect V_{CC}, the micro controller follow the sequence 2.

Mute on $\rightarrow$ Mute Operation $\rightarrow$ Mute off $\rightarrow$ Normal operation (Sequence 2)

Test Circuits
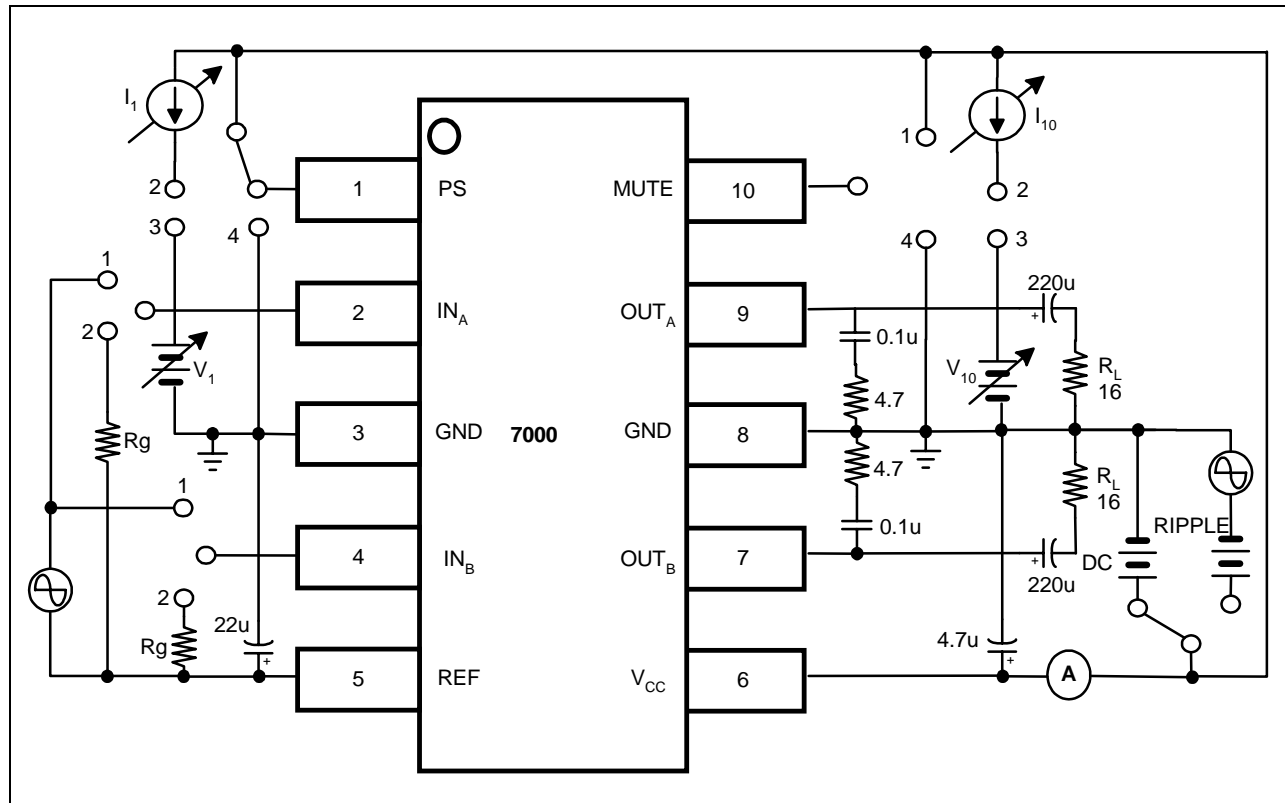
Typical Application Circuits
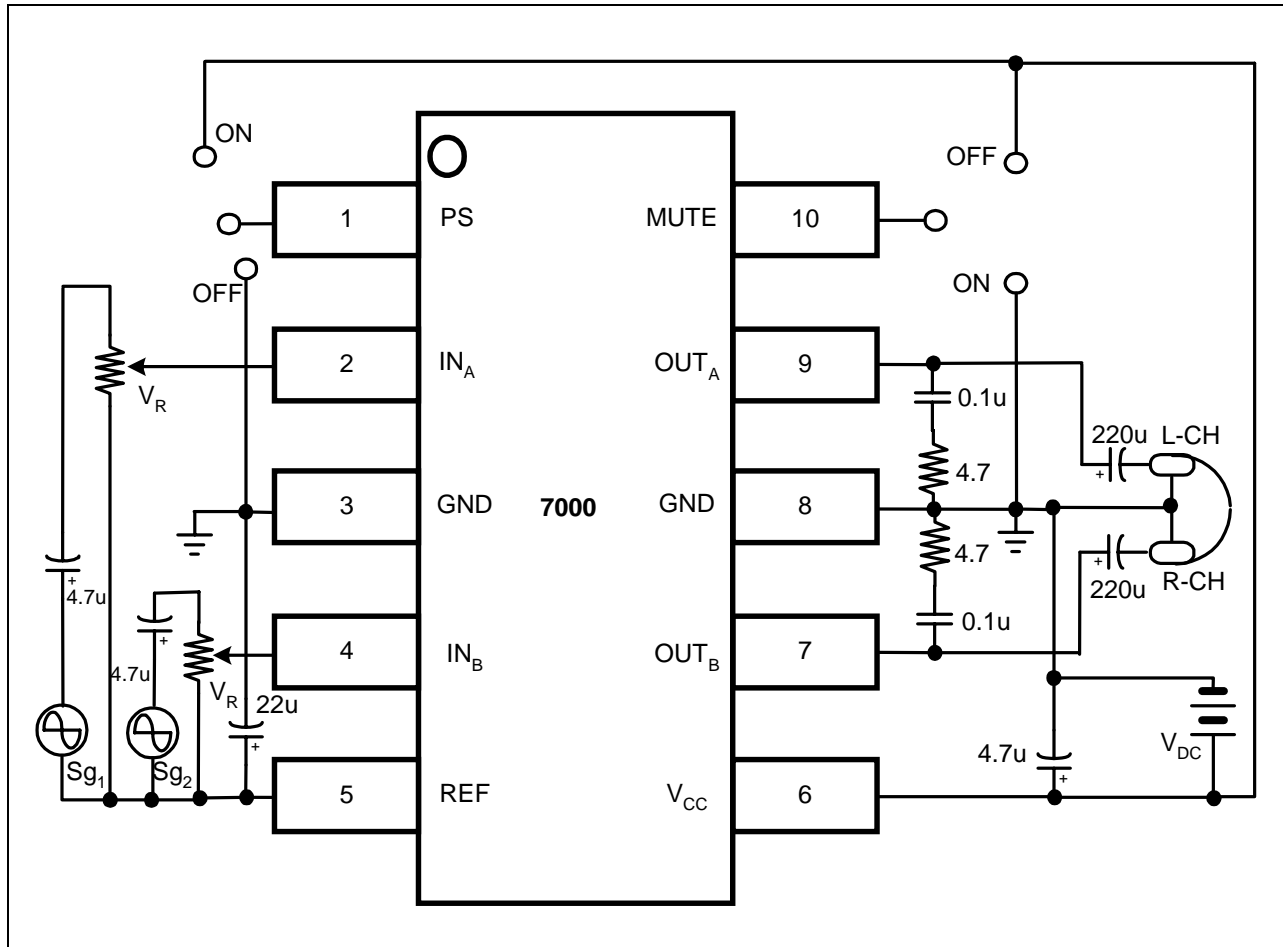
To make output wave largest， add an 91K resistor between pin6 and pin5

Package Dimensions

10-SSOP