
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

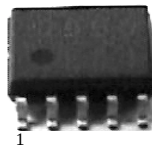
Typical Applications

- 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

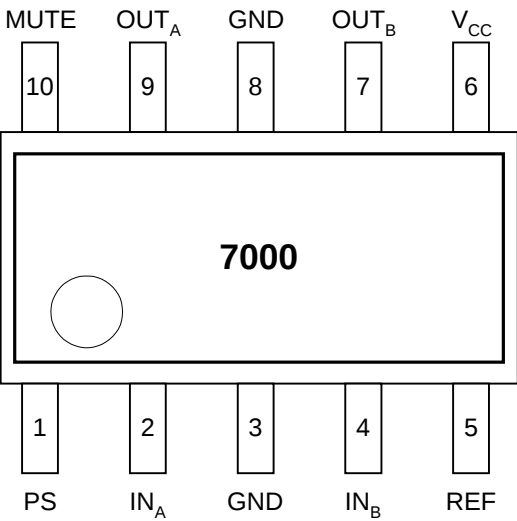
The BM7000 is a monolithic integrated circuit and suitable dual amplifier for low power.

10-SSOP



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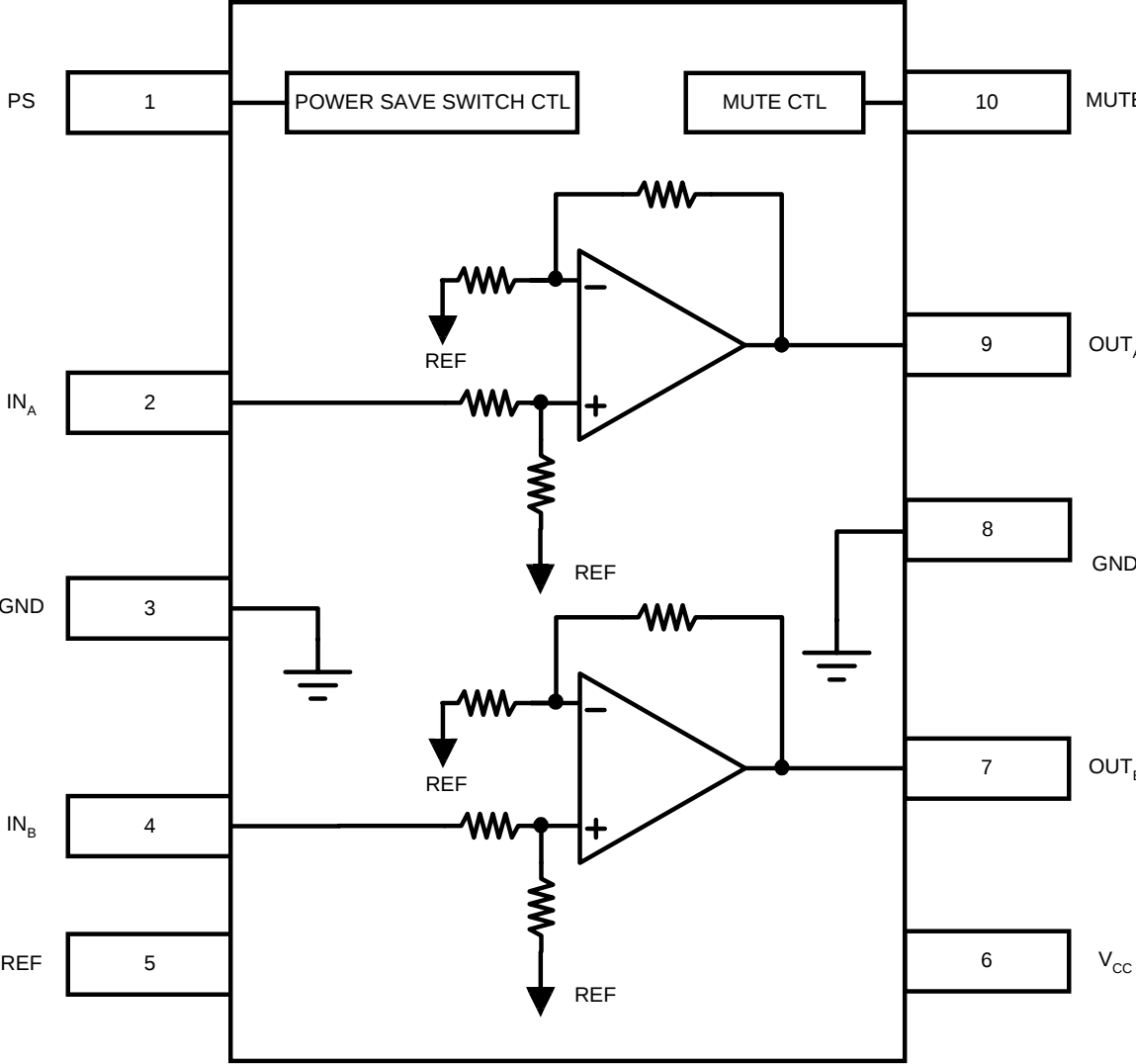
Pin Assignments



Pin Definitions

Pin Number	Pin Name	Pin Function Description
1	PS	Power Save Switch
2	INA	Signal Input A
3	GND	Signal Ground
4	INB	Signal Input B
5	REF	Reference Voltage
6	VCC	Supply Voltage
7	OUT _B	Signal Output B
8	GND	Power Ground
9	OUT _A	Signal Output A
10	MUTE	Mute On Switch

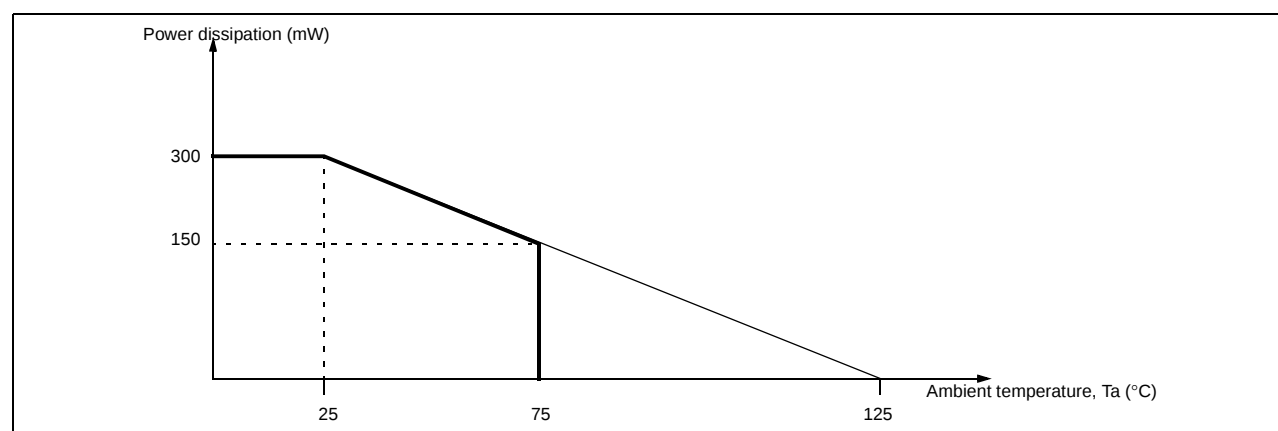
Internal Block Diagram



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 ($R_L = 16\Omega$, $R_g = 600\Omega$, $T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Current 1	I_{CC1}	$V_{CC} = 2.4\text{V}$	-	5.5	10.0	mA
Quiescent Current 2	I_{CC2}	$V_{CC} = 4.5\text{V}$, Mute = GND	-	1.0	2.0	mA
Quiescent Current 3	I_{CC3}	$V_{CC} = 4.5\text{V}$, PS = GND	-	-	1.0	μA
Close Loop Voltage Gain 1	G_{VC1}	$V_{CC} = 2.4\text{V}$, $f = 1\text{KHz}$, $V_O = -10\text{dBm}$	30	32	34	dB
Close Loop Voltage Gain 2	G_{VC1}	$V_{CC} = 1.8\text{V}$, $f = 1\text{KHz}$, $V_O = -20\text{dBm}$	29	32	34	dB
Channel Balance 1	ΔG_{V1}	$V_{CC} = 2.4\text{V}$, $f = 1\text{KHz}$, $V_O = -10\text{dBm}$	-	-	1.0	dB
Channel Balance 2	ΔG_{V2}	$V_{CC} = 1.8\text{V}$, $f = 1\text{KHz}$, $V_O = -20\text{dBm}$	-	-	1.0	dB
Total Harmonic Distortion	THD	$V_{CC} = 2.0\text{V}$, $f = 1\text{KHz}$, $P_O = 1\text{mW}$	-	0.5	1.5	%
Ripple Rejection Ratio	RR	$V_{CC} = 1.8\text{V}$, $f = 100\text{Hz}$, $R_g = 1\text{K}\Omega$, $V_R = -20\text{dBm}$, BPF = 100Hz	43	60	-	dB
Crosstalk	CT	$V_{CC} = 2.4\text{V}$, $f = 100\text{Hz}$, $R_g = 1\text{K}\Omega$, $V_O = -10\text{dB}$	43	50	-	dB
Output Noise Voltage	V_{NOISE}	$V_{CC} = 4.5\text{V}$, $R_g = 1\text{K}\Omega$, BPF = 20Hz ~ 20KHz	-	60	100	μVrms
Output Power	P_{OUT}	$V_{CC} = 3.0\text{V}$, $f = 1\text{KHz}$, THD = 10%	20	40	-	mW
PS Attenuation Ratio	ATT_{PS}	$V_{CC} = 1.8\text{V}$, $f = 100\text{Hz}$, PS = GND, $V_{IN} = -10\text{dB}$	-	-	-80	dB
MUTE attenuation ratio	ATT_{MU}	$V_{CC} = 1.8\text{V}$, $f = 100\text{Hz}$, MUTE = GND, $V_{IN} = -10\text{dB}$	-	-	-80	dB
PS ON input current	I_{PSON}	$V_{CC} = 1.5\text{V}$, $V_{REF} \geq 0.85\text{V}$	-	0.2	1.0	μA
MUTE OFF input current	I_{MOFF}	$V_{CC} = 1.5\text{V}$, $V_{REF} \geq 0.85\text{V}$	-	0.2	1.0	μA
PS ON high level	V_{HPS}	$V_{CC} = 1.5\text{V}$, $V_{REF} \geq 0.85\text{V}$	0.5	0.65	-	V
MUTE OFF high level	V_{HMU}	$V_{CC} = 1.5\text{V}$, $V_{REF} \geq 0.85\text{V}$	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 $\frac{V_{OUT}}{V_{IN}} \cong 40 \cong 32[\text{dB}]$

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

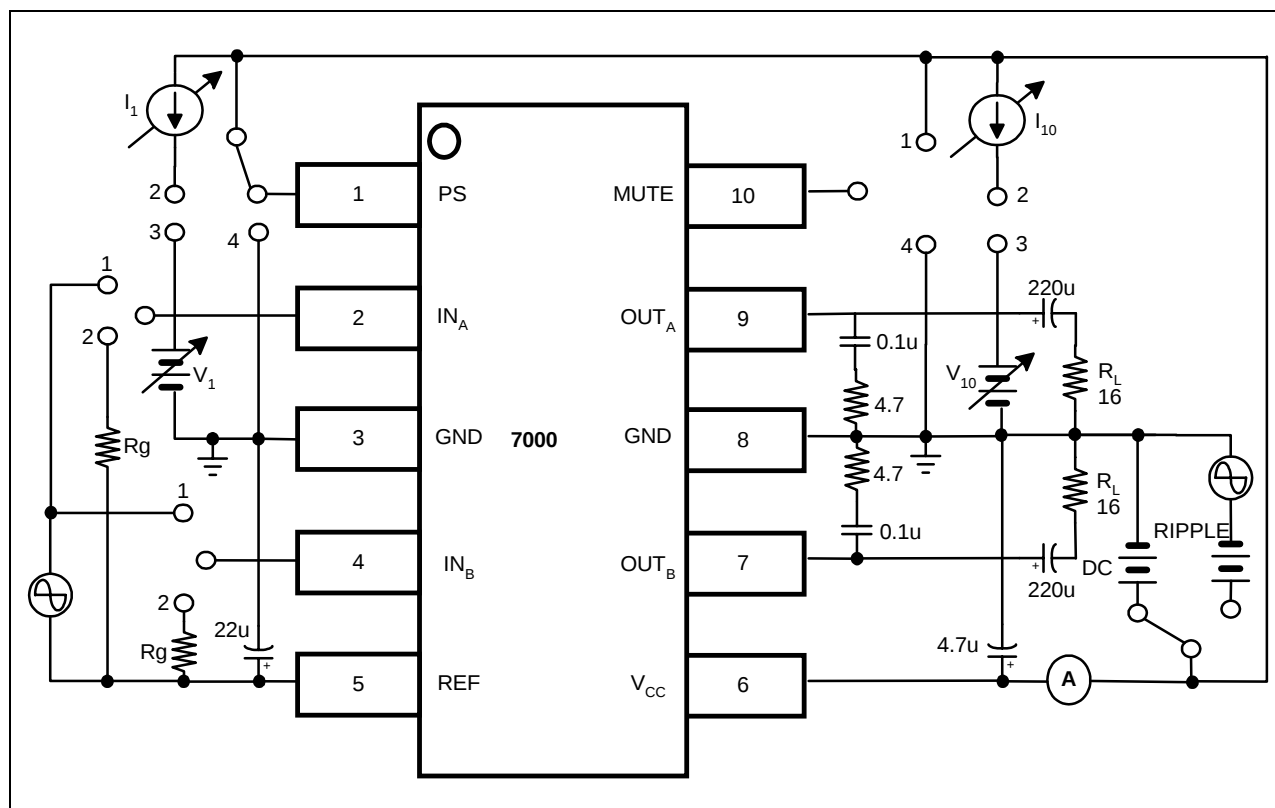
If PS pin (Pin1 , Power save switch) connect the micro controller, the micro controller must follow the same sequence 1 in order to reduce popping noise on mute mode.

PS on → Mute on → PS off → Mute operation → PS on → Mute off → Normal operation (Sequence 1)

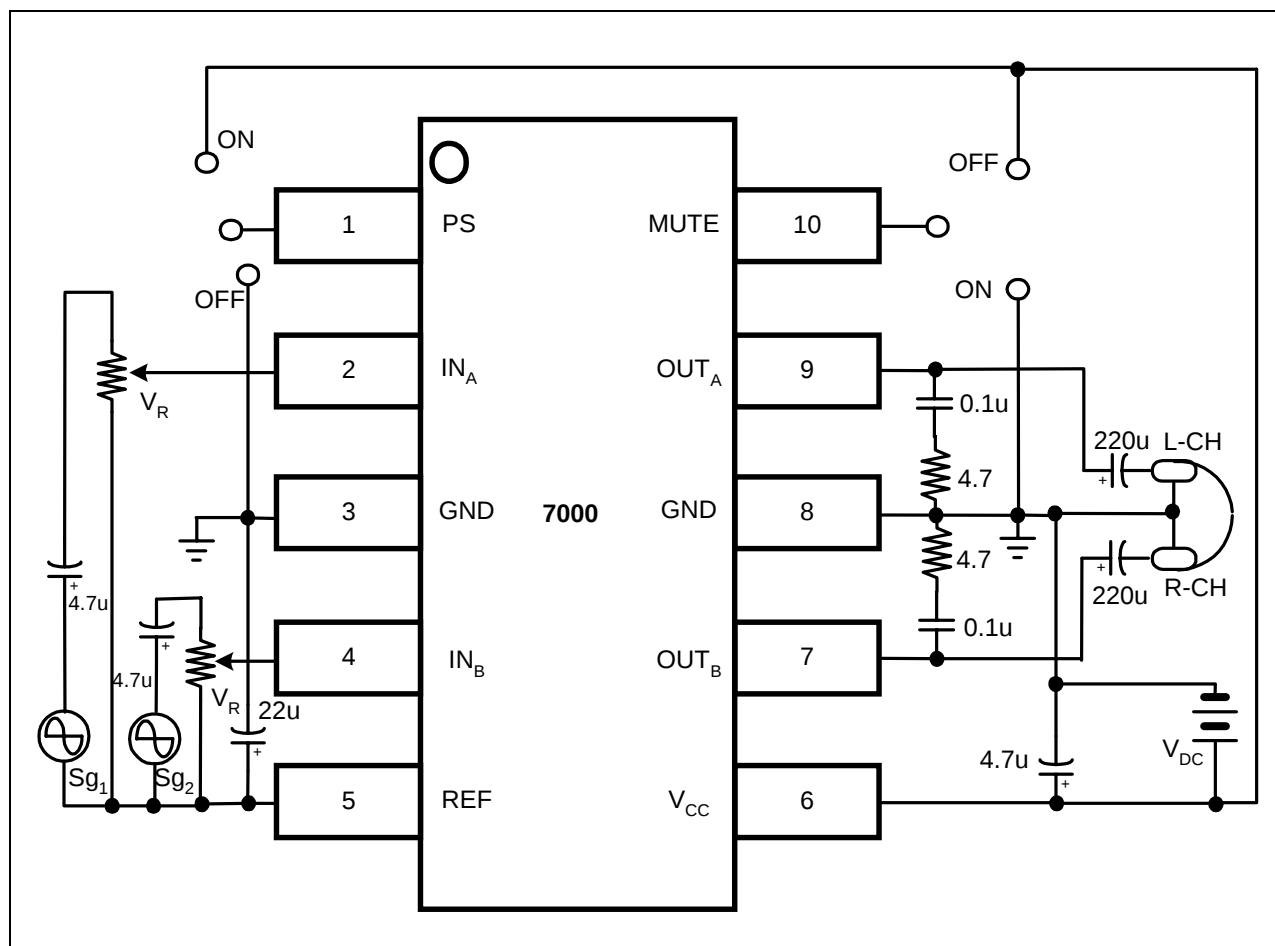
If PS connect V_{CC}, the micro controller follow the sequence 2.

Mute on → Mute Operation → Mute off → Normal operation (Sequence 2)

Test Circuits



Typical Application Circuits



To make output wave largest , add an 91K resistor between pin6 and pin5

Technical drawing of a 10-pin connector, showing three views: Top View, Side View, and Front View. Dimensions are provided in millimeters (mm) with tolerances.

Top View:

- Overall width: 6.00 ± 0.3
- Overall height: 1.27
- Pin pitch (center-to-center): 0.8
- Pin diameter: 0.6
- Pin length (from top surface): 1.00
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6

Side View:

- Overall width: 1.55 ± 0.2
- Overall height: 4.92 ± 0.3
- Pin pitch (center-to-center): 0.6
- Pin diameter: 0.6
- Pin length (from top surface): 1.00
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6

Front View:

- Overall width: 6.00 ± 0.3
- Overall height: 0.2 ± 0.05
- Pin pitch (center-to-center): 0.8
- Pin diameter: 0.6
- Pin length (from top surface): 1.00
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6
- Pin diameter (from side view): 0.6
- Pin diameter (from front view): 0.6