

The BA6890FP is a 4-channel H-bridge-type, BTL driver for the motors or actuators on a CD player.

Features

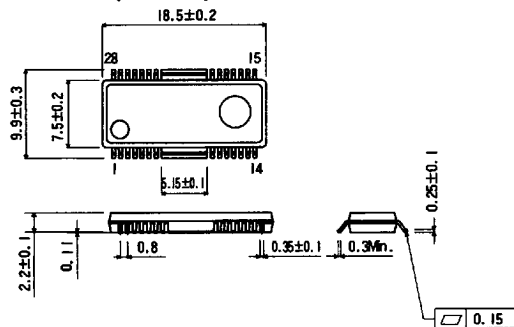
- available in a HSOP28 package
- supply voltage range (1.5 ~ 9 V)
- wide dynamic range (2.5 V typically at $V_{CC} = 4V$, $R_L = 8 \Omega$)
- gain of driver output can be changed by changing a single external resistor
- independent power supply for each preamplifier and power amplifier.
- internal mute circuit provided for each of the 4 channels
- built-in thermal shutdown circuit

Applications

- CD player
- CD radio cassette players

Dimensions (Units : mm)

BA6890FP (HSOP28)



Block diagram

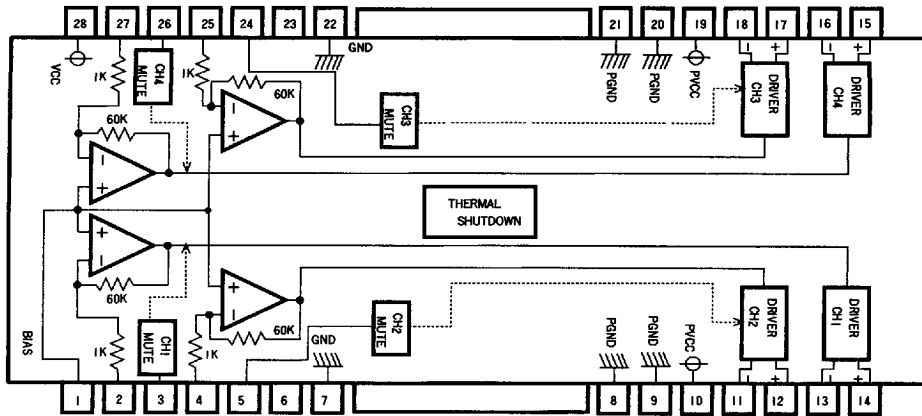


Table 1 Pin description (Sheet 1 of 2)

Pin no.	Symbol	Description
1	BIAS	Bias input
2	IN1	Driver CH1 input
3	MUTE1	Driver CH1 mute
4	IN 2	Driver CH2 input
5	MUTE2	Driver CH2 mute
6	TEST	Test input. Nothing should be connected to this pin.
7	PREGND	Preamplifier ground
8	PWGND	Power amplifier ground. IC heat dissipation fins are connected to this pin internally
9	PWGND	Power amplifier ground
10	V _{CC} POW	Power amplifier supply
11	OUT2-	Driver CH2 negative output
12	OUT2+	Driver CH2 positive output
13	OUT1-	Driver CH1 negative output
14	OUT1+	Driver CH1 positive output
15	OUT4+	Driver CH4 positive output
16	OUT4-	Driver CH4 negative output
17	OUT3+	Driver CH3 positive output
18	OUT3-	Driver CH3 negative output
19	V _{CC} POW	Power amplifier supply
20	PWGND	Power amplifier ground

Table 1 Pin description (Sheet 2 of 2)

Pin no.	Symbol	Description
21	PWGND	Power amplifier ground
22	PREGND	Preamplifier ground
23	NC	Not used
24	MUTE3	Driver CH3 mute
25	IN3	Driver CH3 input
26	MUTE4	Driver CH4 mute (brake pin)
27	IN4	Driver CH4 input
28	V _{CC} PRE	Preamplifier supply

Note: The driver output has the same polarity as the corresponding input (for instance: when pin 2 input is HIGH, pin 14 is HIGH).

Absolute maximum ratings (T_a = 25°C)

Parameter	Symbol	Limits	Unit	Conditions
Power supply voltage	V _{CC}	18	V	For both V _{CC} PRE, V _{CC} POW
Power dissipation	P _d	1.7	W	Reduce power by 13.6 mW for each degree above 25°C, on a phenol paper PCB (50 × 50 × 1.0 mm thick)
Operating temperature	T _{opr}	-30 ~ +85	°C	
Storage temperature	T _{stg}	-55 ~ +150	°C	

Recommended operating conditions (T_a = 25°C)

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Preamplifier supply voltage	V _{CC} PRE	3		9	V	
Power amplifier supply voltage	V _{CC} POW	1.5		9	V	

Electrical characteristics (unless otherwise noted, $T_a = 25^\circ\text{C}$, $V_{CC} = 8\text{ V}$, $R_L = 8\ \Omega$, $f = 1\text{ kHz}$)

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Quiescent current 1 (V_{CCPRE})	I_{Q1}	2.2	3.8	5.4	mA	Input open
Quiescent current 2 (V_{CCPOW})	I_{Q2}			1	mA	Input open
Standby current	I_{ST}			1	μA	
Input voltage, offset	V_{OI}	-5		5	mV	
Output voltage, offset	V_{OO}	-30		30	mV	
Dead zone width	V_{DB}	1	4	10	mV	Total for positive and negative sides
Output amplitude	V_{OM}	2.0	2.5		V	
Gain (close circuit)	G_{VC}	12	14	16	dB	
Gain, positive and negative voltage differential	ΔG_{VC}	-1.5	0	1.5	dB	
Mute-on voltage	V_{MON}	2.0			V	
Mute-off voltage	V_{MOFF}			0.5	V	

Figure 1 Test circuit

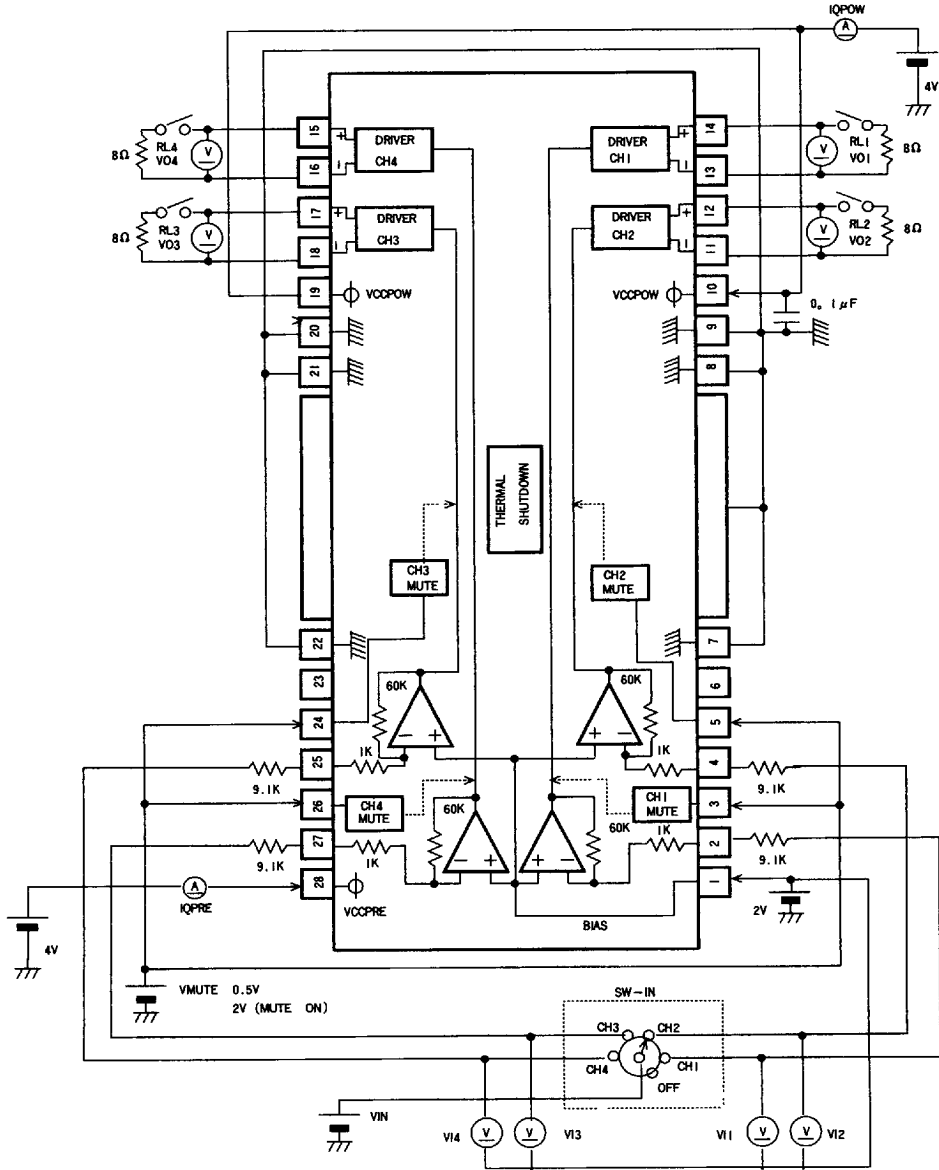


Table 2 Test circuit switch states

Test	V _{IN}	IN	V _{PRE}	RL	Test point
I _{Q1}	OFF	OFF	ON	OFF	IQPRE
I _{Q2}	OFF	OFF	ON	OFF	IQPOW
I _{ST}	OFF	OFF	OFF	OFF	IQPOW
V _{O1}	OFF	CH 1 ~ 4	ON	OFF	VI 1 ~ 4
V _{OO}	0 V	CH 1 ~ 4	ON	ON	VO 1 ~ 4
V _{DB}	-50 ~ +50 mV sweep	CH 1 ~ 4	ON	ON	Confirms V _{IN} range for VO 1 ~ 4 at 0 mV
V _{OM}	±0.7 V	CH 1 ~ 4	ON	ON	VO 1 ~ 4
G _{VC}	±0.3 V	CH 1 ~ 4	ON	ON	20 log (VO 1 ~ 4)/V _{IN}
G _{VC}	±0.3 V	CH 1 ~ 4	ON	ON	G _{VC} + G _{VC} - differential

Note: The input offset is also the center of the dead zone. If this moves away from the dead zone width (4 mV), output occurs at the point $V_{IN} = V_{BIAS}$. This is the output offset voltage. See following illustration.

Figure 2 Dead zone

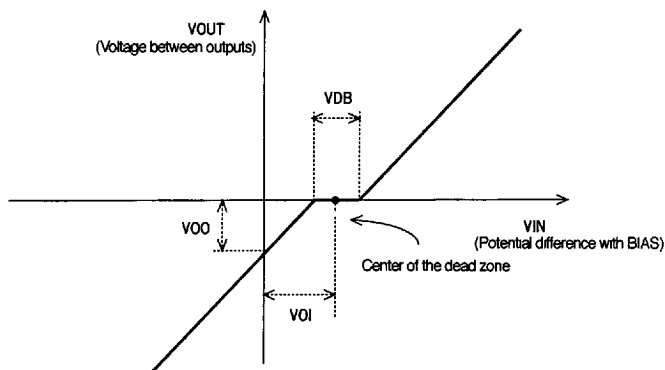
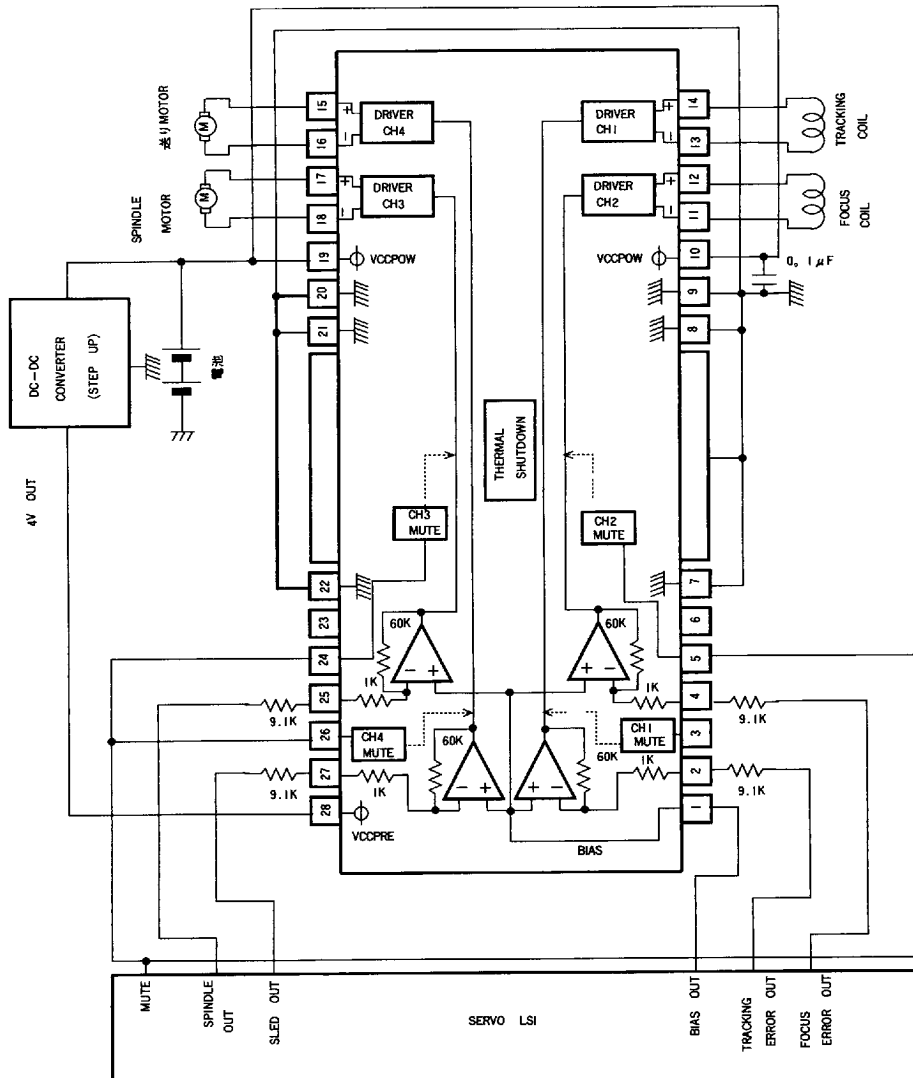


Figure 3 Application example



Operation

Precautions for use

- A thermal shut down circuit is built into the BA6890FP. When the temperature of the chip reaches 175°C (typically), the output current is muted. The thermal shutdown switch resets when the temperature falls below 155°C
- If any mute pin voltage is greater than 2.0 V, the output current can be muted. Under normal operating conditions, make sure to pull all mute pins to less than 0.5 V. Each channel is muted independently
- The dead zone width is determined as follows:
 Dead zone width = input resistance × 0.2 μA

Input resistance = external resistance + internal resistance (1 KΩ)

Example: If the external input resistance 9.1 KΩ:

$V_{DB} = (9.1 K + 1 K) \times 0.2 \mu = 2 mV$; with the total for each positive and negative side, this is a 4 mV dead zone. When the output is in the dead zone, the output pin is in the high impedance state

- Make sure to connect a 0.1 μF capacitor to the dc supplied power main input to filter out voltage ripples.
- Because the gain is high, if a long wire is connected to the pin that adjusts the gain, the output may oscillate due to free capacitance. Consequently, keep these wires as short as possible in your designs.
- Heat dissipation fins are attached to the GND on the inside of the package. Make sure to connect these to the external GND.

Electrical characteristic curves

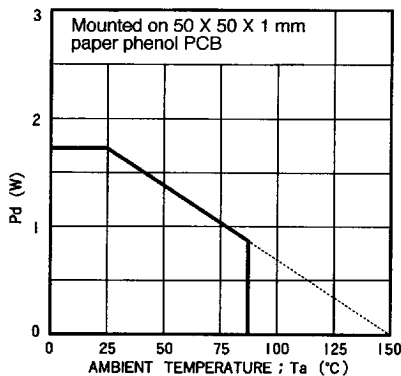


Figure 4